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TABLE OF CONTENTS

EDWARD K. STRONG and HELEN J. GREEN. Short-Cuts to Scoring an Interest Test 1

HOWARD P. LONGSTAFF. Analysis of Some Factors Conditioning Learning in General Psychology 9

W. N. KELLOGG. The Influence of Reading Matter upon the Effectiveness of Adjacent Advertisements 45

BERNARD O. NEBEKKER. Relation between Interest and Achievement 59

KEY LEE BARKLEY. The Demonstration of a New Method for Determining the Relative Efficiencies of Advertisements in Magazines 74

LANCASTER HUMM. A Chart for the Better Evaluation of Intelligence Quotients 91

Notes and News 97

Book Reviews 99

New Books and Pamphlets 105

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The Journal of Applied Psychology

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SHORT CUTS TO SCORING AN INTEREST TEST

EDWARD K. STRONG, JR., AND HELEN J. GREEN
Stanford University

The procedure used to score the Vocational Interest Test differentiates occupational groups to a greater extent than any other method which has been tried out. It does, however, have the very serious objection that it requires considerable labor. Even when the scoring is done on a Hollerith machine it is necessary to pull 420 cards from the file, one card for each response on the blank, and each of these cards must later be returned to the file. When a machine is not available the scoring by hand involves the summation of 420 weights for each occupational rating. Since there are now available 25 occupational scales, 10,500 weights must be handled in scoring one blank.

For these reasons considerable interest has been manifested in short-cut methods, particularly since the method is being applied to other tests.[1] Since the cost of determining the relative value of different methods is considerable, even negative results should be reported in order to save the labor of others who may otherwise investigate such methods all over again.

In a previous article[2] the method of scoring the Vocational Interest Test was discussed at length. Certain short cuts were shown to be inadequate, since they did not differentiate one occupational group from another as well as the method now

[1] For example, The Masculine-Feminine Test of L. M. Terman and the Personality Inventory of R. G. Bernreuter.

[2] E. K. Strong, Jr., *Procedure for Scoring an Interest Test*, Psychological Clinic, Vol. XIX, No. 2, April, 1930. See also the Manual published by the Stanford University Press.

in use. At that time only a small amount of data was at hand bearing on two of the short cuts mentioned. Additional data have been gathered and are now reported.

When one fills out an interest test he indicates whether he likes, dislikes or is indifferent to the items. The standard method of scoring provides a weight for all three reactions. The question has been raised whether satisfactory results might not be obtained by scoring only the responses of liking and thus ignoring responses of indifference and disliking. This seems rather plausible since likes and dislikes vary approximately inversely; *i.e.*, as likes increase, dislikes decrease, and *vice versa*, for nearly all items on the blank. If the scoring would be based on likes only, the labor of scoring would be cut about two-thirds.

If this short cut is not feasible would it not be possible to restrict the scoring to likes and dislikes, ignoring indifferences? The total of all the weights, for example, on one occupational scale for liking the first 193 items on the interest blank, equals 600, for disliking these items the total equals 472 and for indifference it equals 325. By ignoring the indifferences which amount to 23 per cent of the total, could not satisfactory results be obtained? If so, there would be a resulting saving of about one-third the time of scoring such blanks.

Three hundred and sixty interest blanks were employed to test out these possibilities. They were drawn at random equally from the three occupational groups of engineers, lawyers and ministers. Each blank was scored on the five occupational scales for certified public accounting, engineering, law, ministry and selling life insurance, using the standard scoring procedure and for comparison the two proposed short cuts.

For a short-cut method to be accepted in place of the standard method it must meet two requirements. First, scores on the two methods must correlate very high with one another and second, the short-cut method must differentiate occupational groups from one another as well or better than the

standard method. The first requirement is obvious; the second is, if anything, more important, although it has been overlooked by some.

Correlation coefficients between scores obtained by the standard method and the short-cut method of considering likes only are given in Table I. The average of all fifteen correlation

TABLE I

Correlation between scores obtained by the standard method and by the short-cut method of considering only likes

OCCUPATIONS OF MEN SCORED	OCCUPATIONAL SCALES USED					
	Public Accounting	Engineering	Law	Life Insurance	Ministry	Average
Ministers	.86 ± .02	.92 ± .01	.75 ± .03	.92 ± .01	.78 ± .02	.85
Lawyers	.86 ± .02	.95 ± .01	.78 ± .02	.92 ± .01	.76 ± .03	.85
Engineers	.88 ± .01	.93 ± .01	.79 ± .02	.91 ± .01	.81 ± .02	.86

coefficients is .85. Similarly, the correlation coefficients between scores using the standard method and the second short cut method of considering only likes and dislikes are given in Table II. Here the average of all fifteen coefficients is much

TABLE II

Correlation between scores obtained by the standard method and by the short-cut method of considering only likes and dislikes

OCCUPATIONS OF MEN SCORED	OCCUPATIONAL SCALES USED					
	Public Accounting	Engineering	Law	Life Insurance	Ministry	Average
Ministry	.908 ± .011	.968 ± .004	.913 ± .010	.979 ± .003	.960 ± .006	.946
Law	.943 ± .006	.971 ± .003	.979 ± .003	.966 ± .004	.984 ± .002	.969
Engineering	.959 ± .005	.985 ± .002	.939 ± .007	.967 ± .004	.977 ± .003	.965

higher (*i.e.*, .96) than in the first comparison. It is only to be expected that these coefficients should be high because the like scores in the first case constitute more than a third of the scores comprising the standard method scores and in the second case

the scores based on both likes and dislikes constitute more than two-thirds of the scores comprising the standard method scores.

The coefficients given in Table I are hardly high enough to warrant using the first short cut as a substitute for the standard method. On this ground the first short-cut method may be eliminated from further consideration. But the coefficients in Table II are high enough to lead one to consider seriously the possibilities of the second short-cut procedure. The next question to raise is whether or not the short-cut method using only likes and dislikes differentiates occupational groups as well as the standard method.

The extent to which the standard procedure of scoring is superior to the short-cut method of disregarding indifferences in differentiating occupational groups is shown in Table III. There are presented the Q_1, Median and Q_3 measures when the blanks of 120 engineers are scored for enginering interest (*i.e.*, 185, 278 and 361) and similarly when scored for interest in public accounting, law, life insurance and the ministry. Data based on the blanks of 120 lawyers and 120 ministers are similarly given. In the fourth column are shown the differences between the medians of an occupational group scored on its own scale and one of the four other scales. And in the fifth column are given the quotients obtained by dividing these differences by the square root of the sum of the two quartiles when squared.[3] The second half of the table gives correspondingly the data when the short-cut method is employed.

The standard procedure differentiates occupational groups better than the short-cut method in all four comparisons using

[3] Since all data are based on 120 blanks the formula used here was

$$\frac{\text{Med}_x - \text{Med}_y}{Q^2_x + Q^2_y} \text{ not } \frac{\text{Med}_x - \text{Med}_y}{Q^2\text{med}_x + Q^2\text{med}_y}$$

When the latter formula is used the following are obtained for the engineering blanks: engineering and public accounting scales, standard procedure 30.0, short-cut method 21.7; engineering and lawyer scales, 26.2 and 18.8, respectively; engineering and life insurance scales, 37.8 and 29.6, respectively; engineering and minister scales, 36.2 and 36.0, respectively.

TABLE III

Differentiation of occupational groups by standard scoring procedure contrasted with that by the short-cut method in which only likes and dislikes are scored

	STANDARD PROCEDURE					SHORT-CUT METHOD SCORING ONLY LIKES AND DISLIKES				
	Q_1	Med.	Q_3	Difference between medians	Difference divided by $Q_{diff.}$*	Q_1	Med.	Q_3	Difference between medians	Difference divided by $Q_{diff.}$*
Engineers scored on:										
Engineering scale	185	278	361	.....	.....	181	271	338	.....	.....
Public accounting scale	–41	14	68	264	2.66	48	91	137	180	2.01
Lawyer scale	–88	–5	87	283	2.28	33	98	160	173	1.71
Life insurance scale	–236	–142	–54	420	3.33	–125	–40	41	311	2.73
Minister scale	–325	–217	–83	495	3.32	–269	–169	–55	440	3.31
Lawyers scored on:										
Lawyer scale	156	269	370	.....	.....	228	308	400	.....	.....
Engineering scale	–128	–22	60	291	2.05	–100	–15	73	323	2.67
Public accounting scale	–6	61	114	208	1.69	64	112	162	196	1.98
Life insurance scale	–79	6	114	263	1.83	6	107	175	201	1.67
Minister scale	–164	–39	106	308	1.79	–150	–45	125	353	2.18
Ministers scored on:										
Minister scale	319	450	553	.....	.....	265	386	455	.....	.....
Engineering scale	–188	–104	–11	554	3.78	–155	–67	14	453	3.56
Public accounting scale	–92	–45	11	495	3.88	–13	39	74	347	3.32
Lawyer scale	–22	57	135	393	3.50	81	152	218	234	2.00
Life insurance scale	–111	–30	70	480	3.25	0	75	155	311	2.54

* See footnote No. 3.

blanks of ministers, in three comparisons using blanks of engineers (in one case there is no difference) and in one comparison using lawyer blanks. In the other three cases the short-cut method is superior. To repeat, in twelve comparisons the standard procedure is superior in eight cases, equal to the short cut in one case and inferior in three cases. Actual count of the number of overlapping cases at the statistical landmarks of $-Q$, $-2Q$ and $-3Q$ support the above almost exactly. It appears, consequently, that the short-cut method employing only like and dislike responses will give scores which correlate very high (between .908 and .985) with those obtained by the standard procedure, but that the short-cut method will not differentiate one occupational group from another as well as the standard procedure.[4]

SHORT-CUT METHOD PROPOSED BY BIRNBERG AND ROSENSTEIN

Miss Isabelle Rosenstein and Mr. Edward Birnberg of the University of Minnesota have proposed that the weights used by our standard procedure which at that time ranged between $+30$ and -30[5] be reduced to weights ranging from 9 to 0. Their weight of 9 was given to all our weights above 10, their weight of 8 to our weights of 10, 9 and 8, their weight of 7 to our weights of 7, 6 and 5, etc. In this way they eliminated negative weights and used fewer weights all told.

If the Minnesota weight be represented by X and the standard weight by Y then

$$X = \frac{Y}{3} + 5$$

(fractions being dropped). From this is obtained a formula for converting the total Minnesota score into the standard score, *i.e.*,

$$Y = 3\,(X - 5N)$$

where N equals the number of scorable items on the blank.

[4] The data from the blanks of lawyers suggests that possibly in some cases the short-cut method might be found to be of value.

[5] Subsequently reduced to $+15$ to -15.

As an actual fact the converted scores obtained by this formula do not agree exactly with those obtained by the standard procedure. Consequently, it is important to determine how close is the approximation. One way of showing this is given in Table IV where correlation coefficients between the

TABLE IV

Correlation between scores obtained by the standard procedure and by the short-cut method proposed by Birnberg and Rosenstein

OCCUPATIONS OF MEN SCORED	OCCUPATIONAL SCALES USED					
	Public Accounting	Engineering	Law	Life Insurance	Ministry	Average
Ministry	.976 ± .003	.991 ± .001	.968 ± .001	.989 ± .001	.996 ± .000	.984
Law	.981 ± .002	.984 ± .002	.994 ± .001	.989 ± .001	.988 ± .001	.987
Engineering	.965 ± .004	.985 ± .002	.980 ± .002	.986 ± .002	.994 ± .001	.982

scores by the two methods are given. The average of all 15 cofficients is .984.

Another way of determining how closely the Minnesota scores approximate the standard scores is by comparing the letter ratings (A, B +, B, B – and C) into which the scores are ordinarily converted. Only two differences in letter ratings occur in scoring the blanks of 120 ministers and only four each in scoring the blanks of a similar number of lawyers and engineers. This gives complete agreement of letter ratings in 350 out of 360 cases. Moreover, all these differences are borderline cases, one falling on one side, the other on the other side of a critical score separating letter ratings.

We may conclude that the Minnesota procedure gives equivalent scores to the standard procedure and consequently will differentiate occupational groups equally well. Is it, however, a short-cut procedure?

Birnberg and Rosenstein urged that their method be used as a saving in scoring blanks by hand. It appeared at first that it would be a time saver. After scoring several hundred papers, however, it was clear that it actually took longer. (Unfortunately, the records on this point have been lost.)

Our assistants were, moreover, unanimously of the opinion that it was more monotonous and altogether more disagreeable to use the Minnesota method than the regular scoring procedure. A great many of the weights with the standard method are between −4 and +4 which are easily tapped out on the two counters. With the Minnesota plan such weights of −4, −3 and −2 are replaced by 4, weights of −1, 0 and 1 by 5, and weights of 2, 3 and 4 by 6. There is accordingly much more tapping to be done by the Minnesota method than by our procedure.[6]

The Minnesota method has one real advantage over the present procedure in scoring Vocational Interest Blanks on the Hollerith machine. At the present time two columns are required for each scale since the present weights ranging between +15 and −15 are replaced by weights between 0 and 30, which require two columns on a Hollerith card. The Minnesota method requires but one column since it employs only weights from 9 to 0. At the present time the 25 occupational scales require 50 columns which can only be used on an 80 column card. But the 45 column card is more widely used. The present 80 column card will provide space for only 38 occupational scales (four columns are necessary to give each card an identifying code number). With the standard procedure the 45 column card limits the Hollerith machine to the scoring of 20 occupations, the 80 column card to the scoring of 38 occupations. The Minnesota method would double the number of occupations that could be thus scored. Those having available a Hollerith machine using a 45 column card may make immediate use of this Minnesota procedure. For the remainder, the present procedure is superior for scoring without a machine and is readily adaptable to an 80 column card. When a larger number of occupational scales are at hand it will be necessary to restrict the weights to a range of from 0 to 9, instead of from 0 to 30 as at present.

[6] It is possible to omit tapping weights of −1, 0 and 1 (weight of 5 by the Minnesota method) and to make proper allowance for this. But even this does not make up for the additional labor involved.

ANALYSIS OF SOME FACTORS CONDITIONING LEARNING IN GENERAL PSYCHOLOGY*

HOWARD P. LONGSTAFF
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PART I

I. INTRODUCTION

This study is concerned with the introductory course in psychology as now given at the University of Minnesota. In general, an attempt has been made to evaluate its aims and content, methods of instruction, measures of achievement, and student attitudes towards various features of the course. A problem of this sort which is dynamic and constantly changing, which contains such a multiplicity of factors, many of which are very difficult or nearly impossible to control, has a tendency to grow to proportions which not only become unwieldy but excessively difficult to present in a logical fashion. For these reasons we must limit ourselves to rather narrowly defined problems and must admit at the outset that our treatment is far from exhaustive.

Three major problems will be discussed in the following order: the general course in psychology, its aims and content; the lecture-quiz *vs.* the all-lecture method of instruction; and the effect on achievement of segregating the superior students.

The literature in this field is meager when considered from

* The writer is especially indebted to Professor D. G. Paterson, Dr. R. M. Elliott and Dr. Charles Bird for suggestions concerning experimental procedures, participation in teaching the course, preparation of measuring instruments and treatment of results. For additional aid in the preparation of the various examinations and cooperation in following the experimental conditions of teaching the author owes much to Drs. Edna Heidbreder, W. T. Heron, Kate Hevner, P. E. Schellenberg, W. G. McAllister and H. E. Carter.

the standpoint of our specific problems. The literature on the aims and content of the introductory course in psychology is not only small in quantity but primarily a matter of individual opinion. The writer is not aware of any study treating the problem of lecture-quiz *vs.* all-lecture as methods of teaching at the university level. The related topic of class size has been much written about as the result of experiments performed at the secondary and elementary school levels. But here again the problem of class size as treated heretofore is not identical with our present problem. The large class in the literature consists of from 35 to 60 students, whereas, in our problem these are regarded as small classes.

The fundamental disagreement which exists among psychologists regarding the content of the introductory course in psychology and the teaching methods employed, was strikingly illustrated to the writer when he heard several of the foremost American psychologists[1] express their ideas regarding the materials which should comprise the introductory course, what its aims should be, and how it should be taught. The differences of opinion were amazing. One lecturer insisted that there should be many and varied experiments and demonstrations in order that students might have opportunity to appreciate scientific method and to get training in its use; another scoffed at the attempts to do experimental work in the beginning course and referred to such efforts as "vaudeville stunts;" others maintained that psychology should be taught for its own sake and with no intent to use it as a practical tool; still others insisted that the only reason for teaching psychology was to assist students in meeting squarely their commonplace problems. These same differences of opinion exist in the literature.[2]

[1] These psychologists addressed a seminar on the teaching of psychology conducted by Dr. Richard M. Elliott at Columbia University during the summer of 1928.

[2] Space does not permit a detailed summary of this literature. The following articles are discussed in the original thesis on file in the Uni-

These differences are probably due, at least in part, to the various problems instructors of psychology find in universities and colleges in different sections of the country. The teacher in a small institution is faced by an entirely different situation from that confronting the teacher in a large university; and conditions in a privately endowed institution are somewhat different from those in a State supported one. Psychology, being in its infancy, has much in its subject-matter which is based upon opinion rather than fact, and this, together with the extreme complexity of its problems, results naturally in differences of opinion and conflict among its supporters.

This situation leads one to the conclusion that it is impossible to organize an introductory course and adopt a method of presentation which will meet with wide-spread approval among present day psychologists.

At the University of Minnesota the Department of Psychology is confronted with the problem of teaching the introductory course to approximately sixteen hundred students during a given academic year, the extension division not included. The matter of mere numbers is complicated by the diversity among the students with reference to vocational and professional objectives: illustrative figures showing proportional enrolment in one year follow on the next page.

A questionnaire was also given at the end of the course to all students taking general psychology during the period 1928–30, which will be described in detail in section two. One of the questions had to do with reasons why the students took psychology. It was found, when the answers to this question were tabulated, that fifteen per cent of these students take the introductory course together with a supplementing course in laboratory psychology to fulfill the credit requirement in natural science; fifty-six per cent as a curricular course requirement; and twenty-nine per cent as a free elective.

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versity of Minnesota Library: Schoen (34), Dashiell (8), Skaggs (36), Arnold (2), Lauer (22), Meyer (30), Hollingworth (14).

TABLE I

Consolidation of Fall, Winter, Spring Quarters 1931

MEN	WOMEN	TOTAL	ARTS	H.E. AGR.	ENGR.	NURSE	D.HYG.	PHAR.	CHEM.
642	783	1425	1016	132	8	40	16	1	2
45%	55%	100%	71.3%	9.3%	.56%	2.8%	1.12%	.07%	.14%
Educ.	Bus.	Grad.	Univ. Col.	Fresh.	Soph.	Jun.	Sen.	Grad.	Uncl.
190	11	2	6	82	1184	114	25	2	20
13.3%	.77%	.14%	.42%	5.7%	83.2%	8.0%	1.75%	.14%	1.4%

These data were secured by a questionnaire given to 724 students taking the general course in psychology during the fall quarter of 1928.

Of the total number of students who take the introductory course each year—about sixteen hundred—a large number will not graduate from college, and, of the remainder, only about two per cent. will continue as majors or minors in psychology. Consequently, a course devised only to prepare students for further work in psychology would be open to the suspicion that it was poorly adapted to the interests and needs of all but a small fraction of the registrants.

It must also be observed that the introductory course is taught by a staff of eight or nine persons, most of whom teach other courses and five of whom direct graduate students.

What should be the aim in teaching such a heterogeneous group? How should the course aim to meet the needs of the prospective psychology majors? How seriously should it consider the needs of the large number, as yet unidentifiable, who will never graduate and will have only this one course in psychology? What consideration should be given to the various pre-professional groups? And how much should the general cultural aspects of psychology be stressed for those students working toward an academic degree? Compromise is the only solution. With this conviction the course has been organized with emphasis upon its possible theoretical and practical values for students in their every-day life. In addition, the aim is to lay a basis for work in fields of study allied to psychology as

well as to provide an introduction to advanced work in psychology. To accomplish these ends the course has been organized around the following aims:[3]

A. *Preparatory aim; pre-professional.*

To impart the principles, methods, facts and values of a science of human behavior in such a way that this knowledge will function effectively in the subsequent training of psychologists and other specialists in the social and biological sciences.

B. *General developmental aim; orientation or survey.*

To orient the general student in the scientific study of human nature with a view to deepening insight into and extending control over problems of every-day life. This necessitates emphasis upon:

I. *Scientific Method.* To define the nature and significance of science as contracted with worldly wisdom, subjective opinion and prejudice, and pseudo-knowledge.

1. To show how human thinking has evolved from myths, primitive fears, and superstitions to organized knowledge which permits the prediction and control of events. To illustrate stages in the history of man's thought about himself. To make clear the influence of the introduction of scientific method.
2. To analyze the methods by which the boundaries of present knowledge may be extended through controlled observation, experimentation and hypothesis. To emphasize the technique of the experiment and the importance of mathematical treatment.
3. To point out the identity of scientific method in astronomy, physics, and the like, on the one hand,

[3] As presented by Dr. R. M. Elliott in a seminar in teaching psychology given at Columbia University, summer term 1928.

and psychology on the other. To designate special difficulties in many psychological problems.

4. To extend the concept of law to human behavior; *i.e.*, given the same conditions or causes, the same results, or effects, follow.
5. To exhibit human nature as an object of scientific study by experimental methods.
6. To warn against such common errors of thinking as tend to the promulgation of pseudo-science, fallacies of verbalism, pseudo-simplicity of the problem, neglect of negative instances, animistic and demonistic interpretations, etc.

II. *Psycho-Biology.* To promote an understanding of the relation of man to nature and of the human psychophysical organism as a product of biological development through natural laws.

1. To envisage the (hypothetical?) continuity of living and non-living phenomena. To compare living substance and life processes against a background of physico-chemical phenomena. To point out the inadequacies of vitalistic formulations.
2. To trace the genetic development of man, morphologically, physiologically, and psychologically, stressing the likenesses and differences between human and infra-human behavior.
3. To trace the ontogenetic development of human behavior.
4. To compare and relate hereditary and acquired factors in behavior, with emphasis on biological foundations. To call attention to sources of biological variability.
5. To analyze the fundamental concept of adjustment, *i.e.*, the energy interchange between an organism and its environment whereby organic integrity is preserved, environmental insults are withstood, and developmental activities promoted.

To analyze adjustment as response, dependent upon stimulation, conduction and movement.

6. To study the modification of behavior in the individual, or learning.
7. To follow the search for the sources of energy which expresses itself in motives, drives and purposes. To point out that such forms of behavior as may be described in these terms, and that "mind" itself, is a non-mystical property of the living organism.

III. *Social Control and Psychotechnology.* To make clear the applicability of scientific methods, in particular those of differential psychology, to the understanding and control of human nature in the home, school, workshop, and other social institutions.

1. To promote habits of quantitative thinking with respect to human traits and functions.
2. To illustrate in a variety of fields the uses and applications of the methods of differential psychology and the potentiality of psychology as an instrument of human engineering.

IV. *Personal Development.* To develop self-improvement techniques, such as more efficient methods of work and study. To illustrate the importance of integrated emotional adjustments and to enhance appreciation for personality values.

1. To assist the student toward more adequate self-knowledge and an objective appraisal of the assets and liabilities of his personality.
2. To apply the resources of scientific psychology to those activities and functions of the self which are subject to improvement—these include learning, work, and study; vocational activity; recreational and leisure activities; general social life and adjustments; sex and parental functions; and the like.

The subject-matter taught during the period of this investigation to achieve the aims as listed above, consists of the following topics: (a) First quarter-term: scientific method, methods of psychology, and the inter-relation of the sciences; reactions, the nervous systems, levels of reaction, and tendencies to reactions; native traits, instinct, and emotion; attention, learning and memory; (b) second quarter-term: imagery and association; testimony and suggestion; personality; character analysis; individual differences; intelligence and correlation; heredity, genius and mental deficiency; history of insanity, causes and symptoms of mental disorder, dissociation, hysteria, conflict, phantasy, and the like; mental hygiene; and the social significance of psychology.

The introductory course in psychology at the University of Minnesota is a course with three meetings per week for two quarter-terms, each eleven weeks in length. The texts used during the academic year of 1928–29 were Woodworth's "Psychology" (first edition), Gates' "Elementary Psychology," and Hart's "Psychology of Insanity." During the year of 1929–30 Hollingworth's "Mental Growth and Decline" was substituted for Gates. In 1930–31 Garrett's "Great Experiments in Psychology" was substituted for Hollingworth. A copy of the assignment sheet for the year 1929–30, given to each student, is presented on the following page.

The writer undertook, at the beginning of the academic year 1928–29, to obtain data which would throw light on two main problems; namely, (1) student attitudes toward the elementary course during the years 1928–30, and (2) student achievement as affected by certain variations in methods of instruction. The problem of student achievement was studied primarily as a partial basis for administrative decisions regarding economical and efficient methods of conducting the elementary course. The study of student attitudes was designed, for the most part, to indicate to what extent the elementary course seems to be meeting the needs of the students and to what extent variations in methods of instruction would be approved by the students affected.

PSYCHOLOGY 1—1929

Textbooks: 1. Woodworth, R. S.: Psychology, A study of Mental Life. (*Old Edition*)
2. Hollingworth, H. L.: Mental Growth and Decline.

The following schedule will be adhered to strictly. Obtain your textbooks immediately. In addition to the hour test scheduled there will be a ten-minute examination at the end of each week.

ASSIGNMENTS

Week No.	*Topic*	*Woodworth*	*Hollingworth*
I	Introduction	1–20	1–16
II	Reactions	21–44	102–115
III	Levels of Reaction	45–55; 188–204	
IV	Levels of Reaction	45–55 Review 55–67; 204–212; 236–240	
V	Levels of Reaction Tendencies to Reaction Mid-Quarter Examination	55–67 Review 68–88	
VI	Native Traits Instinct	89–104	85–98; 123–133
VII	Instinct Emotion	105–117	115–118; 296–300
VIII	Emotion Attention	125–136 244–270	145–151 229–248 256–267
IX	Learning	296–311	206–213
X	Learning	311–331	133–144
XI	Memory	332–365	
XII	Memory	332–365	
	Final Examination		

PSYCHOLOGY 2—1930

Woodworth: Psychology, Old Edition.
Hollingworth: Mental Growth and Decline.
Hart: Psychology of Insanity.

Week No.	*Topic*	*Woodworth*	*Hollingworth*
I	Imagery & Association	366–388	
II	Association (Cont'd)	481–522	160–180
	Testimony		34–48
III	Suggestion & Personality	523–558	198–206
			213–222
			256–267 (Review)
IV	Character Analysis	271–283	68–72
	Individual Differences	285–293	222–248
			248–256
V	Intelligence		17–28
	Mid-Quarter Examination		191–198
			268–280
			305–314
VI	Correlation	283–285	49–67
	Heredity		288–290
		Hart	
VII	Genius & Mental Deficiency	1–20	152–159
	History of Insanity		180–185
			224–228
			329–332
VIII	Causes & Symptoms of Mental Disorder	20–97	314–324
	Dissociation: Hysteria		332–344
		Woodworth	
IX	Dissociation: Conflict	558–570	
	Dissociation: Phantasy, etc.	*Hart* 97–142	
X	Mental Hygiene	148–173	
	Social Significance of Psychology	*Hollingworth* 280–296	
XI	Social Significance of Psychology		

Final Examination

II. Student Attitudes Toward the Introductory Course in Psychology

In the preceding section, attention was called to the lack of uniformity in present thinking and opinions of psychologists concerning the content and aims of the introductory course. A statement of the general problem facing the Department of Psychology at the University of Minnesota was made, pointing out the heterogeneity of the student group taking psychology and the diversity of their needs. The aims and content of the introductory course devised to meet these needs were presented.

It was felt that a study of student attitudes toward the course as a whole, towards its content and level of difficulty, and an analysis of the attitudes held by the various curricular groups taking the introductory course should furnish information that would be of value in determining how adequately the course as now taught was meeting the demands made of it.

It must be admitted that the questionnaire method is not as satisfactory a way of evaluating a course of study and related problems as one would like to have, but in the absence of more objective methods or as a means of confirming results obtained by other methods, it is to be considered at least fairly satisfactory procedure. Koos (23) points out that studies made by the questionnaire must be justified on the basis of two criteria. a. Is the problem worth investigating? that is, is there a need for such a study, and b, Can results be obtained by any other method? There can be little doubt that any information which throws light upon how efficiently we are meeting students' needs is of value. The second question can be answered in both the negative and affirmative. Some of the questions investigated in this study could be answered by other methods and were; yet it seemed worth while to seek confirmation of these answers by the use of the questionnaire; others could be approached in no other way. Koos further recommends the questionnaire method for securing opinions,

judgments, and expression of attitudes. He also states that the questionnaire is found to be especially useful in securing opinions concerning the field of administration broadly conceived, and curriculum. The questions utilized in the questionnaire in this study dealt primarily with just such problems. Koos recommends that great care be taken in making out the questionnaires. The questionnaire used herein was the result of considerable time and thought on the part of four members of the psychology department.

Koos states further that "subjects who answer the questionnaire should be capable and willing of answering." The subjects used in this experiment were college students of sophomore rank or higher; consequently, it would seem that they should be capable of answering specific and definite questions concerning their experience with the course in psychology and in other courses. Since the questionnaire was given during a regular class period, and every effort was made by the instructors to impress upon them that their frank and candid opinions were sought, in order that the department of psychology could better evaluate the efficiency of the introductory course in meeting students' needs, it would seem that willingness would be adequately taken care of. Koos recommends that the questions in such a questionnaire be short and require responses of as simple a type as possible. It is believed that the questions used in this study were, on the whole, clear and specific, and as pointed out above dealt with facts with which the students were conversant. Considerable effort was made to state the items directly and to phrase them in such a manner as to encourage truthful responses. Most of the questions had several parts which permitted recording varying shades of meaning or value. The questionnaire was validated by comparing the findings with those obtained by other measures such as those of student achievement, etc. In view of the precautions taken in preparing and administering the questionnaire, and the consistency of the results obtained, we believe that the findings to be reported can be looked upon

with a considerable degree of confidence from the standpoint of their validity.

The questionnaire used in this investigation is reproduced below. It was given the last day of the course to all students taking general psychology during the regular college years of 1928–29 and 1929–30. The students were assured that their opinions would have no effect upon their grades in the course, and that the information was being collected for statistical purposes only. The students who answered the questionnaires during the school year 1928–29 signed their names. There are arguments both for and against this procedure. Katz and Allport (21, pp. 371) discuss this practice as follows: "Some investigators are careful to assure the subjects . . . that there is no way of identifying his questionnaire. Others have felt that students will give more serious cooperation if asked to sign their names, since doing so involves a greater feeling of personal responsibility. To a large extent the answer to this question probably depends upon the nature of the attitude that is being studied. Individuals seem to have two sets of attitudes on many questions, namely, the opinions they are willing to publish or make known (their public attitude) and the opinion which they will express only to their intimate friends (their private attitude). In studies where individuals know that their questionnaires will be identified they are probably more likely to respond with their public attitudes. Where the questionnaire form is anonymous we may expect to secure closer approximation of their private attitudes." Since students freely discuss their various courses, it would seem that we were dealing with their "public attitude" and signing their names should have little influence upon their replies. In order to discover whether there was any decided difference in the nature of student responses when they signed their names and when they gave their opinions anonymously, only a part of the group who answered the questionnaire during the year 1929–30 were asked to sign their names. The others were instructed not to sign. There was practically no

difference in the replies of the two groups and those which do exist show no decided trend in favor of either the signed or the unsigned questionnaires.[4] The reason for having the 1928–29 group sign their names was to secure information on the various curricular groups of students in the course.

The contents of this questionnaire are being obtained for *statistical purposes only*. They are aimed solely to assist the Department of Psychology in improving its instruction. The questionnaires will not be examined until all final grades have been filed with the Registrar. What you answer here will neither help or harm you. It will help the University. Your frank and *conscientious* cooperation is asked.

1 ( ) If I had a brother or sister in next year's sophomore class I would (1. insist upon; 2. recommend; 3. say nothing about; 4. discourage; 5. strongly discourage) his taking Psychology 1–2.

2 ( ) Comparing Psychology 1–2 with other college courses I have had I would rank it in QUALITY (1. first; 2. in the highest one-fourth of courses; 3. above average; 4. below average; 5. in the lowest one-fourth; 6. last).

3 ( ) Comparing Psychology 1–2 with other college courses I have had I would rank it in amount of *EFFORT AND STUDY REQUIRED* (1. first; 2. in the highest one-fourth of courses; 3. above average; 4. below average; 5. in the lowest one-fourth; 6. last).

4 Comparing Psychology 1–2 with the *average* college courses I have taken I rate it:

A( ) (1. more; 2. equally; 3. less) difficult
B( ) (1. more; 2. equally; 3. less) stimulating to thought
C( ) (1. more; 2. equally; 3. less) interesting
D( ) (1. more; 2. equally; 3. less) valuable for other college courses or professional training
E( ) (1. more; 2. equally; 3. less) applicable to every-day life

5 The work of the SECOND quarter as compared with the FIRST quarter was:

A( ) (1. more; 2. equally; 3. less) difficult
B( ) (1. more; 2. equally; 3. less) stimulating to thought
C( ) (1. more; 2. equally; 3. less) interesting
D( ) (1. more; 2. equally; 3. less) valuable in connection with other college work
E( ) (1. more; 2. equally; 3. less) applicable to every-day life

[4] The data for this conclusion are contained in Table 21 in the appendix of the original copy of this thesis on file in the Library of the University of Minnesota.

Number in order of importance (for you) the following subdivisions of the course. (Place 1 before the highest in importance down to 6 before the lowest under the heading "Rank Order."

6 Rank Order

A ..... Nervous system
B ..... Native and acquired traits; instinct; emotion
C ..... Learning and memory
D ..... Imagery, suggestion, association, personality
E ..... Intelligence and individual differences
F ..... Abnormal psychology

7 I (do, do not) intend to take more psychology courses. (Elementary Laboratory not included)

8 The following methods of organizing this course are practical. Rank from 1 (highest) to 3 (lowest) to express the order of your recommendation as to which method should be adopted.

A ..... Three large lectures (550 students) per week
B ..... Two large lectures and one quiz (50 students) per week
C ..... Three independent section meetings per week (lectures and discussions) (50 students)

9 Assuming all Psych. 1–2 teachers had equal and very high ability I would prefer: (rank as above)

A ..... Three large lectures (550 students) per week
B ..... Two large lectures and one quiz (50 students) per week
C ..... Three independent section meetings per week (lectures and discussion) (50 students)

10 ( ) If I were taking Psychology 1–2 in small sections of about 50 students I would prefer to have the sections made up of (1. A and B students only; 2. C students only; 3. D and F students only; 4. all types of students from F to A)

11 I took Psych. 1–2 to fulfill the science requirement Yes No
As a required subject in my curriculum Yes No
As a free elective Yes No

The following major topics and the questions which bear upon them outline the content of this section.

1. *Student Attitude Towards the Course as a Whole.* How does psychology compare with other courses on the campus? Is it considered of equal quality? Is it as provo-

cative of thought? As interesting? As valuable in connection with other college work? Is it as applicable to every-day life? Do students complete the course with a desire to take more psychology? Do they consider it of sufficient value to recommend it to their friends? What proportion indicate a desire to take more psychology?

2. *Student Attitude Towards the Content and Level of Difficulty of the Introductory Course in Psychology.* Is the content of the course fulfilling student needs? Do they consider the practical or theoretical subjects more valuable? Is psychology considered as a "pipe" course? Do students like a course because it is easy, or can a course be considered difficult and still be interesting and valuable? Which topics in the general course are considered most difficult?
3. *Opinions of the Various Curricular Groups.* Are the opinions of the various curricular groups of students taking psychology in agreement with those of the whole group taking the course? Or do they show that we are meeting the needs of only certain groups of students? Which content or topics of the course are considered most valuable by the various curricular groups of students?

If the course in general psychology is meeting the aims outlined in Section I and is fulfilling the needs of the students we should expect students to answer the questions listed above under the heading, "Students' attitudes towards the course as a whole," in a favorable manner. Evidence for this and the following conclusions are presented in Table 2 (which contains condensed results taken from Table 21 in the appendix of the original thesis on file in the University of Minnesota Library, which shows the results of the opinions of 2,057 students answering the questionnaire during the period 1928 to 1930). Of these students 91% would insist upon or recommend to their friends (literally, "a brother or sister in

TABLE 2

Table of condensed results showing students' attitudes towards the course as a whole. These results were obtained from 2,057 students over a period of two years

QUESTION	ABBREVIATED STATEMENT OF QUESTION	VALUE ASSIGNED	PER CENT ANSWERING
1	If I had a brother or sister	Insist or recommend	91
2	Comparing psychology with other courses in quality	Above average	95
3	Comparing psychology with other college courses which I have had on the basis of difficulty	In highest one-fourth above average	51 83
4	a Comparing psychology with average courses as to difficulty	Equal or more	87
	Comparing psychology with average courses I have had:		
	b Provocative of thought	Equal or more	96
	c Interesting	" " "	92
	d Valuable for other courses	" " "	90
	e Applicable to every-day life	" " "	95
5	The work of the second quarter as compared with the work of the first was:	Equal or more	
	a Difficult	" " "	57
	b Provocative of thought	" " "	79
	c Interesting	" " "	67
	d Valuable in connection with other college work	" " "	79
	e Applicable to every-day life	" " "	77
6	Rank in order of importance for you the following topics of the course	Average Rank	Rank Order
	a Nervous system	5.03	6
	b Native and acquired traits, instinct, emotion	4.52	5
	c Learning and memory	3.99	4
	d Imagery, suggestion, association, personality	3.74	3
	e Intelligence and individual difference	3.27	1
	f Abnormal psychology	3.44	2
7	I do intend to take more psychology		55

next year's sophomore class'') that they take the course (question 1). In answer to questions 2 and 4, the group as a whole consider psychology very favorably in comparison with other courses. On every comparison ninety or more per cent of the students rate psychology as equal or superior to the average course they have had.

It would seem from these findings that students consider the course of equal or better quality and value than the average course taken by freshmen and sophomores at the University of Minnesota. In response to question 7, 55% of the students indicated their intention to take more psychology, which should be indicative of their favorable attitude towards the course. If taking a course in psychology had not proved worth while it is not likely that such a large proportion would wish to take more of it.

Such decidedly favorable student opinion of the course seems to indicate that the course is meeting student needs. The strength of this conclusion is increased when we consider that the results were obtained over a two-year period, and remain consistent for that period.

Condensed results bearing upon the second general topic of student attitude towards the content and level of difficulty are found in the students responses to Question 5 which deals with the relative value of the topics taught during the first and second quarters. It is to be remembered that the work of the first quarter dealt with the more traditional and theoretical topics of psychology, such as the nervous system, instincts and the like. The work of the second quarter is made up largely of the more practical subjects such as suggestion, intelligence, individual differences, abnormal psychology and related topics. It was found that, in general, the students prefer the work of the second quarter to that of the first.[5]

Analysis of the responses to question 6 of the questionnaire furnishes more detailed information concerning the subject-

[5] Detailed tables showing these findings are to be found in the original thesis on file in the University of Minnesota Library.

matter of the course. The results from this question were reduced to average ranks and rank orders for each topic in order to present a more concrete picture of the relative standing of the different topics.

The sub-division of the course dealing with individual differences and intelligence is ranked highest in importance, with abnormal psychology a close second. The sub-divisions, learning and memory, and that of imagery, suggestion, association, and personality are ranked third and fourth respectively. Native and acquired traits, instinct, and emotion are thought to be less important than the topics just mentioned while the topic dealing with the nervous system is ranked decidedly lower than any of the others. It is fairly evident from these findings that the students prefer the more practical and applied subject-matter. These findings are in general agreement with those found by Lauer and Arnold, cited in the first section.

It is possible that these results may be due to the course being considered very easy on the assumption that students like easy courses more than difficult ones and consider them more valuable. In order to have a check upon this possible criticism the replies to questions 3 and 4a, which deal with the relative difficulty of the introductory course in psychology in comparison with the other college courses were included in Table 2. Responses to these questions show that psychology is not only not considered an easy course but is actually thought to be more difficult than the average course given on this campus. In response to question 3, 51% of the students ranked it in the highest one-fourth and 83% ranked it above average in difficulty in comparison with other courses which they have taken; while in response to question 4a, 87% of the students consider it equal or more difficult than the average course they have had in college. The discrepancy between the results on question 3 and 4a are probably the result of the wording of these two questions. Question 3 is stated "above average"; while question 4a reads "equal or more." This

discrepancy is additional proof of the fact that the students were taking the questionnaire seriously and actually making discriminating responses.

The results obtained in reply to question 5a show that 57% of the students consider the work of the second quarter easier than that of the first. Thus it would seem that there is only a slight tendency for students to consider the work of the second quarter easier than that of the first. It would appear that we have two factors here which are independently variable, difficulty and value of a course. On the one hand the work of the second quarter may be considered slightly easier because of its greater interest, and on the other hand the material itself may actually be easier. But, since the course as a whole is considered more difficult than the average college course, yet equally or more valuable in comparison with other courses, we have strong evidence that difficulty is not the basis of student judgments of the course's quality; in fact, content seems to be the important factor.

It is evident from these findings that, in general, students feel that the introductory course in psychology is a worthwhile one, that a knowledge of psychology obtained in this course is of value to them in meeting their every-day problems in connection with life situations in college and outside. Furthermore, it is not only interesting but it is stimulating to thought as well. These students prefer the more practical type of subject-matter and recommend it highly to their friends. The course is not considered easy; rather, it requires more effort and study than the average college course. Such being the case, it appears that the content of the course is satisfactory from the standpoint of meeting student needs. Thus it appears to be possible to organize an introductory psychology course with the needs of students primarily in mind and at the same time to maintain it on a level of difficulty which will adequately challenge the talents and powers of Minnesota sophomores.

It was pointed out in the first section that the group of students taking the introductory course at the University of

Minnesota is a very heterogeneous one. Such being the case, it is possible that although the group as a whole may be of the opinion that the course is meeting their needs, yet because of the masking effect of averaging, there may be several curricular groups which do not share this opinion. In order to ascertain whether this condition existed the data were analyzed by curricular groups.

When these findings were studied it was observed that 91% or more of the six groups, Arts, Education, Nursing, Home Economics, pre-Dental and pre-Law would insist or recommend that their brothers or sisters should take the course. Eighty-eight per cent of two groups, Business and Engineering make the same recommendations. Seventy-seven per cent of the pre-Medic group rate it in the same favorable manner. In answer to question 2, 92% or more of eight of the nine groups rate the course above average in quality and 87% of the remaining group indicate the same opinion. The responses to question 4a which asks for a comparison of psychology with other courses on the basis of difficulty, indicate that 91% or more of the Business, Nursing and Home Economics groups; 86% or more of Law, Arts and Education; 83% of the pre-Dental; and 50% of the Engineers and pre-Medical groups indicate that psychology is equally or more difficult. The replies to question 3 where a wider range of responses can be made than on question 4a, indicate that from 79% to 93% of six of the nine curricular groups rank psychology as above average in difficulty. Sixty-two percent of the pre-Dental students consider it above average in difficulty. Thirty-eight percent of the Engineers and 50% of the pre-Medics are of the same opinion. In the case of these two latter groups, such a ranking is interesting in that their curricula are recognized as being among the most difficult in the University, yet a fairly large per cent of each group considers psychology more difficult than their other courses. This is additional proof of the fact that psychology is not considered an easy course. Ninety-three per cent or more of every group except Engineering are

of the opinion that psychology is equally or more provocative of thought, and 88% of the Engineering group are of the same opinion.

All groups rate psychology very high (88% to 100%) from the standpoint of interest when compared with their other courses. Sixty-three per cent of the Engineers and from 85% to 94% of each of the other groups consider it equally valuable or more valuable for their own professional training purposes than the average course they have taken. In applicability of the content of psychology to problems of every-day life from 92% to 100% of each group ranks it very high.

A more specific analysis of the content of the course indicates some variability in the responses of the various curricular groups, as can be seen by studying Table 3. These findings seem to indicate that the various curricular groups of students consider psychology in the same favorable manner that the group as a whole does. Such variations as occur are minor and relatively unimportant. It would seem then, that the course is not only meeting the needs of the student body as a whole, but is also fulfilling the requirements of the various curricular groups.

TABLE 3

This table contains the rank orders assigned the various topics of the course by the various curricular groups

RANK ORDER OF SUB-DIVISIONS OF THE COURSE	ARTS	BUS.	EDUC.	NURS.	ENGR.	HOME EC.	PRE-DENT.	PRE-MED.	PRE-LAW
6 a Nervous system	6	6	6	6	6	6	6	6	6
b Native and acquired	5	5	5	2	3.5	5	5	2	5
c Learning	4	4	3	5	3.5	1	3	4	4
d Imagery and suggestion	3	2	2	3.5	5	2	4	3	1
e Intelligence	2	1	1	1	2	3	2	5	2
f Abnormal Psych.	1	3	4	3.5	1	4	1	1	3

III. The Relative Efficiency of the Lecture and Quiz and All-lecture Method of Teaching Introductory Psychology.

The present system of education puts a premium upon large classes, primarily for economic reasons. State supported educational institutions in particular offer schooling at a price which is considerably below cost so that the difference must be made up through taxation. A rapid increase in student enrollment at these institutions has made necessary the introduction of large classes in order that a due share of the resources of the institution may be devoted to students enrolled in specialized and advanced curricula. These large classes have aroused considerable criticism from people who do not understand the economic situation, and who share the idea that man to man education is the best kind.

Many there are who will admit the impossibility of individualized education but who insist upon an approximation of it in terms of small classes. In fact, the notion is prevalent that the value of instruction decreases proportionately with the increasing size of classes. We shall present evidence in the following pages to show that this assumption is not grounded in fact, at least under all circumstances.

Up to the fall quarter of 1928 the introductory course in psychology had been taught by what we shall hereafter call the lecture-quiz method. This method consisted of giving the students a fifty-minute formal lecture twice a week in large groups of from three to five hundred. A third fifty-minute period each week was devoted to written and oral quizzing and discussion, the students being divided into smaller groups of from thirty to sixty students. These will be designated from now on as "quiz sections." The formal lectures were given by the three senior members of the department, each presenting the materials of the course which were most closely related to the field of his major interest and training. The quiz sections were taught for the most part by junior members of the department and selected teaching assistants.

The increasing enrollment in the introductory course gave rise to a serious problem, that of securing instructors to handle the quiz sections. During the year of 1927 and 1928 there were thirty-eight quiz sections each quarter. This meant that on the average each member of the department was forced to spend five hours a week in teaching quiz sections in addition to his other duties. There were three possible solutions to this problem; (a) increase the number of teachers of professorial rank, (b) increase the number of teachers of instructorial rank, or (c) abolish the quiz sections and present the course entirely by the lecture method. The first solution was obviously impractical. Individuals of professorial rank would find it neither profitable nor interesting to devote a good portion of their time to teaching quiz sections. Furthermore, the increased financial expenditure such a solution would entail would make it nearly impossible. An increase in the number of professors, because it is highly improbable that a professor would be willing to spend all his time teaching the elementary course, would necessitate a change in the policy of the department, which is to keep the number of formal courses as distinct from honors, readings and project courses in psychology at a minimum. The second solution would probably mean a reduction of the quality of instruction. The third solution was contingent upon the question, *how valuable is the method of quiz sections?* Do they materially increase the value of the course to the student, especially when the only practical way of handling them is to have them taught by more or less inexperienced instructors?

Experimental literature which might throw light upon this problem is disappointingly meager.[6] There have been only a few studies made at the college level and most of these have been concerned in comparison of classes of a size that are not

[6] Müller (31), Edmonson and Mulder (9), Holland (16), Kirk (22), Spence (12), Armentrout (1), Scheidemann (36), English (10), Bane (3), Greene (13). The above studies are reviewed in the original thesis on file in the University of Minnesota Library.

comparable to ours. In these studies a class of from forty to sixty has been considered a large class and one from twenty to thirty members has been considered a small one.

To the writer it seems that the experimental evidence submitted to the present time tends to support the general conclusion that there is little difference in student achievement in large and small classes and, also, that it makes little difference as to what method of presentation of the materials of the course is used.

In view of the available experimental evidence and the increasing problems brought about by quiz sections, the Department of Psychology decided to conduct a controlled investigation to ascertain, if possible, the relative merits of the lecture-quiz and all-lecture method. It must be borne in mind that this problem was *not* the relative value of the two methods when both were taught by the best instructors in the department, but whether the lecture-quiz method was superior when the quiz sections were taught by a heterogeneous group of instructors, the majority of whom were junior members of the department and teaching assistants, these two alternatives being the only practical ones possible as the University is now organized.

In attempting an experiment of this nature one is impressed with the narrowness of the prevailing criteria. If there is to be anything like objectivity and control of conditions we are forced to rely upon the criteria of subject-matter achievement and student opinion. Both have been severely criticized but work like that of Gifford's (12) and others tend to show they may not be as inadequate as painted. Using then, the criteria at hand, let us consider an experimental set-up which should answer our question concerning relative merits of lecture and lecture-quiz.

A. We should select two groups of students, teach one by the lecture-quiz method and the other by the all-lecture method. *B*. These groups should be matched as closely as possible on as many characteristics as possible. *C*. Their

knowledge of the subject-matter on entering the course should be ascertained by an examination given the first day of the course. *D*. Ideally, both sections should be taught by the same instructors, but as pointed out above it is not so much the theoretically ideal situation in which we are interested as it is the practical one which faces us at this or any given institution. The lecture portions of both courses should be taught by the same instructors and the quiz sections taught by the type of instructors who would teach them in actual practice. *E*. Achievement should be measured by using as reliable and valid measures, both subjective and objective, as can be secured within the limits of practicability. *F*. All measures should be reduced to a common basis by the most valid statistical methods available. *G*. The final grade in the course should be the composite of all measures used. *H*. Progress and retention should be measured by comparing results obtained upon the examination given the first day of this course and again at the close of each quarter's work. *I*. Student opinion should be obtained by as valid a method as possible.

If the lecture-quiz method is superior to the lecture method, we should expect the following results: *A*. Students taught by this method should show a superior mean achievement of such magnitude as to be practically as well as statistically significant. *B*. Final grades in the course should correlate higher with the grade expected from past achievement and "intelligence" or "college ability" for the lecture-quiz group than the lecture group. If a lower correlation is found between achievement and expected achievement for the lecture-quiz group it would be significant if it were due to a large number of the members of this group doing better than expected. *C*. Student opinion toward the course should be more favorable in the lecture-quiz division than in the lecture. *D*. Using a pre-course examination repeated at the end of each quarter as a criterion of achievement and retention, the lecture-quiz group should show both superior achievement and retention.

To test the above hypotheses the following controlled investigation was conducted. During the fall and winter quarters of 1928–29 two groups of students were selected as subjects. We shall refer to these two groups in the future as the L.Q. Group and the L. Group. The L.Q. Group was the control group. It was taught by the traditional lecture-quiz method. There were 549 students in this group the first quarter and 441 during the second. It met at the first class period in the morning, on Mondays and Wednesdays for the lecture part of the course. For the third meeting this group was divided into quiz sections of about forty students each. There were sixteen of these sections during the first quarter and fourteen during the second, scattered throughout the day on Thursday, Friday and Saturday.

The instructors who taught the quiz sections were: two women instructors, whom we shall call A and B, both of whom have Ph.D. degrees, the rank of associate and assistant professor respectively and have had several years' teaching experience. A third instructor, C, was a man, having the Ph.D. degree, the rank of associate professor and several years' teaching experience; two instructors, D and E, were graduate students working for the Ph.D. degree, having the rank of instructor and several years' teaching experience. One instructor, F, was a male graduate student working towards the doctor's degree, having the rank of senior teaching assistant but with little teaching experience. It is apparent that the quiz section instructors were probably of a higher caliber than is usually the case where the quiz section method is used, and there is no doubt that they were superior to what could be offered if the increase in number of quiz sections continued at this University without greatly increased appropriations.

The experimental group was made up of 409 students the first quarter and 341 the second. It met three times a week in the same large lecture hall that was utilized for the lecture part of the L.Q. Group, at the third class period on Mondays, Wednesdays and Fridays. As mentioned before, the lectures

were given by the three senior members of the department of psychology. The same topics were covered in the lectures for both groups, the only difference being that the L. Group received an additional lecture in place of the quiz section for the L.Q. Group.

Two hundred and fifty-five students who completed the first quarter's work with a passing grade and who completed all of the work of the second quarter, though not necessarily with passing grades, were selected from each group and matched on the basis of an "equation score."

The "equation score" was obtained by taking the average of the sigma scores for Honor Point Ratio earned prior to enrollment in the course, and College Ability Test (C. A. T.). The Honor Point Ratio[7] was secured by having the students fill out a specially prepared mimeographed form, which is reproduced in figure 1. Only work done at the

FIGURE 1.

PRINT NAME HERE_____
Last First Middle

List below in the appropriate columns the following information:

(1) All courses which you have had in college or university (excluding gymnasium and military drill).
(2) Name of college or university where courses were taken.
(3) Credit hours for each course.
(4) Grade received.

Name of course	University or College	Credit Hours	Grade Received	Leave these Spaces Blank

If you need another blank see attendant or inquire at Room 112 Psychology Building.

The above is an authentic statement of my college and university record to date.

Signature .....
Date .....

[7] A system of quality credits wherein a grade of A is given a value of 3 honor points per credit hour, a grade of B, 2 honor points, C, 1 honor point, D, 0 honor points and F, −2 honor points. For a discussion of this system see Miller (29).

University of Minnesota was used in computing the Honor Point Ratio. To check the validity of this method a sample of 177 students' records was examined in the registrar's office. The results of this sampling were as follows: the mean of the deviations was .23 honor points with a σ of .21 honor points. There were about an equal number of plus and minus deviations; the mean of the + deviations being .21 and of the minus .27. This method of securing Honor Point Ratio is not as valid as one would wish, but its validity is probably well within the probable error of measurement as represented by the college marks from which it was obtained. The Honor Point Ratios were transmuted into sigma scores by the following formula[8]

$$\text{Sigma score} = \frac{X - Mx}{\sigma_x} 10 + 40$$

We shall refer to this formula in the future as formula A. The College Ability Test is the entrance examination given to all entering students at the University of Minnesota. It consisted of four subtests of 120 items each, of a vocabulary test. It has a reliability of .95 corrected by the Spearman-Brown Formula. Since the records for this test are kept in terms of centiles they were reduced to sigma scores by referring to a table of areas and ordinates of the normal curve in terms of the abscissa. Such tables give the values of $\frac{X}{\sigma}$ for the varying percent of the area under the curve from .0000 to .4999 the $\frac{x}{\sigma}$ values were substituted in formula A with one variation. Those above the fiftieth centile were added to 40 and those below were subtracted. These formulae are similar to the one used by McCall (27) in securing T scores except that we have assumed the mean at 40 rather than at 50 and the zero point at -4σ rather than at -5σ as he does. This alteration was used to keep the scores as small as possible. It was impossible to match the two groups as to sex in addition to the above measures and retain a sufficiently large number of subjects to secure reliable data. Although there were 55% of the students in the first hour who were matched with those of the same sex in the third hour. 2.8% of the L.Q. group and 3.4% of the L. group were repeating the course.

Both subjective and objective examinations were used as measures of achievement. The subjective examinations consisted of two questions each and will hereafter be referred to as weekly quizzes. They were given at the beginning of the hour each Friday. Eleven minutes were allowed for answering them. Three forms, each of which contained different questions, were used for the L. Group to prevent copying. The questions were mimeographed at the top of a sheet of $8\frac{1}{2} \times 11$ paper. The remainder of the page was used by the student in writing the answers to the questions. A sample examination and key follow:

FIGURE 2.

Se. 2, No. 1

Name ..... Date .....

Directions: Answer the questions below with a maximum number of facts or points. Write yourself out.

[8] X = Score (H. P. R.) $\sigma = \sigma$ of X's.
M = Mean of X's.

1. Define and illustrate a "memory image." Explain carefully each psychological term used in your definition.
2. What is synesthesia? Illustrate.

	1.
2 Points	A memory image is a perception recalled by a substitute stimulus.
	Or
Same score as option	A sensation or complex or sensations recalled by a substitute stimulus.
4 Points	By perception we mean the complex of associations which in their relationships yield the meaning of objects. Thus an apple involves knowledge of properties—color—texture—form, etc.
	Or
Same score as option	By sensation we mean the first response which occurs when the sense organs are stimulated by an adequate stimulus.
4 Points	By a substitute stimulus we mean a stimulus which originally did not arouse a response but which has now the potency or power to do so.
2 Points	Illustration of a memory image. Picturing objects in visual terms when not perceptually present. Same for audition—smell—taste—motor responses, etc.
	2.
3 Points	Synesthesia is responding to stimulation of one group of sense organs by the characteristic response of another group. (Hold students only to meaning of term, not exact verbal statement).
1 Point	Example. Colored hearing. Hearing sounds and seeing them as colored.
16 Max.	Three points or less may be added for excellence of statements or organization. Total Maximum points 19.

These questions and keyed answers were made out by the instructors who gave the lectures. Somewhat the same procedure was followed with the L.Q. Group with the following exceptions: two forms rather than three were used, the questions were not mimeographed but written on the blackboard. The students wrote their answers on theme paper. The instructors in the quiz sections cooperated in making out the questions and scoring keys and the same questions were used for several sections; sections 1 to 6 had one set of questions; sections 7 to 13 another; sec-

tions 14 to 15 another and section 16 had a fourth set of questions. Nine such quizzes were given each quarter. The papers were graded by graduate assistants majoring in psychology. The papers of given groups of students were rotated among the readers from week to week in order to equalize any constant scoring errors that might be operating. The various points in the answers were assigned a numerical value which made it possible to give each paper a numerical score consisting of the total number of points earned. (See sample above.) These numerical scores were plotted as histograms. One of the senior members of the department and the writer went over these histograms dividing them into five intervals. These intervals were assigned grades of 0, 1, 2, 3, and 4, corresponding to the letter grades of F, D, C, B, and A. In making these divisions an attempt was made to assign the following per cents of each grade, 13%, 0's; 16%, 1's; 45%, 2's; 16%, 3's; and 11%, 4's. These grades were posted publicly on a cumulative record blank so that the students might know how they were progressing in the course.

Three objective or new type examinations were given the first quarter and two the second.

The first was given October 26 and covered the first four weeks' work of the first quarter. The second one was given November 12, covering the work given in the interval between October 26 and November 12. The third was the final examination covering the work of the whole quarter. The mid-quarter examination for the second quarter was given February 4, 1929. It covered the work of the second quarter up to the time of its administration. The final examination covered all the work of the second quarter. The first objective examination given in the first quarter contained one hundred questions, twenty-eight of these were analogies, twenty-nine multiple choice, and forty-three completions. Samples of the various types of questions used in the objective examinations under discussion in this section, are reproduced below. These one hundred questions were given to both groups of the course. To prevent cheating the questions were arranged into four forms, by changing the location of the questions in the examination, and by changing the order of the answers within each question. The second hour examination consisted of two sets of eighty questions each. The two sets of questions were given to both groups. Each set of questions was arranged into two forms by changing the order of the answers and the position of the questions in the examination. There were thirty analogy, thirty multiple choice and twenty-one completion types of questions used.

FIGURE 3

Types of objective examination questions used during 1928–29.

Analogy:

(2) Insects: definite pattern instincts: : man: (1. chain reflexes; 2. instinct-habit consolidations; 3. closely organized instincts; 4. emotional reactions).

Multiple Choice:

(1) Glandular responses inhibited in emotional experiences are the

(1. salivary; 2. pituitary; 3. thyroid; 4. adrenal).

Completion:

When separate units of reactions become organized into temporal patterns we speak of.....reactions (6). Ans. *Serial*

Matchings:

Indicate which item in the right-hand column belongs between each pair of items in the left-hand column.

2	Axon—dendrites	1	medulla
3	Learning—recognition	2	cell body
1	Thalamus—spinal cord	3	retention

(complete list not given here)

The two sets proved to be of equal difficulty. The scores obtained and the letter grades assigned to these scores were made available to the students. The final examination at the end of the first quarter was made up of one hundred and fifty questions. As in the second hour examination there were two different sets of questions, and each set was arranged into two forms. The same four forms were given to both groups. The final examination was given to both groups at the same examination period, two hours in length. There were forty-six analogy, sixty multiple choice, twenty matching and twenty-four completion questions used in this examination. Since the two sets of questions did not prove to be of equal difficulty they were equated, by constructing a curve from the plotted percentile points of one examination on the abscissa and of the other on the ordinate. From this curve the differences in difficulty for each score were obtained and added to the score on the more difficult form.

A set of 100 objective examination items was utilized in an attempt to measure knowledge of psychology upon entrance to the course. In this "pre-course examination" there were thirty-four analogy and sixty-six multiple choice questions covering the work of the first quarter. At the end of the first quarter fifty of the one hundred items were inserted in each set of the final examinations. The two sets of fifty each were given again at the last meeting of the second quarter. These one hundred questions had all been previously analyzed by the "trade test" technique as described by Chapman (6) and found to have considerable diagnostic value.

Reliability coefficients for the objective examinations were secured by use of the odd-even technique, and are reproduced in Table 4. Reliability of the subjective examinations was obtained by correlating the sum of the number grades for the odd weeks with the sum of the number grades for the even weeks. The average reliability coefficient for the objective examinations is .88 and for the subjective, .72 (Spearman-Brown correction used).

The final grade for the first quarter's work was obtained as follows: the arithmetical sum, of all the objective questions answered correctly on the three examinations given during the first quarter, was obtained for each student. These scores were reduced to sigma scores and weighted twice the value of the subjective examination average by the following formula which we shall call formula B.[9]

[9] X, M_x and σ_x have the same meaning as in formula A.

$$\text{Sigma score} = \frac{X - M_x}{\sigma_x} 20 + 80$$

The arithmetical average of the weekly quizzes was computed for each student. These averages were transmuted into sigma scores by the use of formula A given above. The two sigma scores were summated for each student and divided by three, giving an average sigma score for each student. These were plotted into a histogram and divided into five groups, to which the letter grades of A, B, C, D, E, F were assigned. There were the following per cents of each letter grade: 7.6% A's, 17.5% B's, 44% C's, 20.9% D's and 10% F's. These grades were the final grades for the first quarter's work for all students who completed the term's work.

TABLE 4

Reliability coefficients of objective and subjective examinations by parts and wholes

The columns headed $r_{\frac{1}{2}\frac{1}{2}}$ show correlations between the odd and even questions of the test; the column headed S–Br_{11} shows whole-test reliability coefficients as estimated by the Spearman-Brown formula. Column headed Number of Subjects contains number of subjects used in computing reliability coefficients.

	$r_{\frac{1}{2}\frac{1}{2}}$	S–Br_{11}	NO. OF SUBJECTS
First hour Exam. 1f	.83	.91	982
Second hour Exam. Form C & D	.77	.87	443
Second hour Exam. Form A & B	.75	.86	487
Final Exam. 1f Forms A & C	.86	.93	455
Final Exam. 1f Forms B & D	.83	.91	454
Mid-Quarter 2w Forms A & C	.80	.90	437
Mid-Quarter 2w Forms B & D	.61	.76	382
Final Exam. 2w Forms A & C	.79	.88	408
Final Exam. 2w Forms B & D	.75	.86	396
Weekly Quizzes 1f	.55	.71	874
Weekly Quizzes 2w	.56	.72	808
Pre-course at end of 1f	.55	.71	718

Table 5 contains a list of the variables used in studying the validity of the measuring instruments and the intercorrelations between the variables used in this study. The validity of the measuring instruments was found by considering the following five variables as criteria of validity:

College Ability Test	(X_6)
Honor Point Ratio	(X_5)
Equation Score	(X_4)
Grades assigned at end of each quarter	(X_1) and (X_2)

The two latter ones are to be used as criteria against which the work of the opposite quarter may be correlated. Using X_6 as the criterion, we find that the average of the correlations between it and the various objective measures used the first quarter (X_7, X_8, X_9, X_{10}, and X_{16}) is .41, and for the objective measures used the second quarter (X_{11}, X_{12}, X_{15}, X_{18}) is .42. The subjective examinations (X_{13} and X_{14}) correlate to the extent of .02 for each quarter with this criterion. Using X_5 as the criterion the average correlation of the objective measures with it is .50 each quarter. The subjective measures correlate to the extent of .49 and .48 for the first and second quarters respectively with this criterion. When X_4, the equation score, is used, the average of the correlations between the objective measures and this criterion is .55 for each quarter and the subjective measures are related to this criterion to the degree expressed by a coefficient of .43 and .44 respectively for the two quarters. Using the final grade of the second quarter's work as a criterion for the work of the first quarter we find that the objective examinations have an average coefficient of correlation of .69 and the subjective examinations correlate to the extent of .64 with this criterion. Reversing this process and using the final grade for the first quarter as the criterion for the second quarter measures, we find an average coefficient of .71 for the objective examinations and .66 for the subjective ones.

If we designate the combined sum of the objectives for the first and second quarter X_{16} and X_{17} respectively and correlate

TABLE 5

Inter-Correlations for Psychology 1f and 2w, 1928–1929. N = 510

X_0	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}
X_1	79	03	61	59	42	78	78	82	74	67	67	81	66	73	93	76
X_2		03	60	57	44	63	66	70	65	62	81	64	84	88	77	92
X_3			03	01	41	36	37	03	26	00	27	01	02	31	38	30
X_4				83	79	52	56	55	46	50	51	43	44	60	63	61
X_5					38	45	50	53	46	44	50	48	48	52	58	55
X_6						40	45	38	35	39	37	01	02	49	48	43
X_7							61	54	48	47	55	56	51	59	80	62
X_8								70	65	61	61	49	50	66	86	68
X_9									86	72	59	52	53	70	89	71
X_{10}										71	55	48	48	65	80	66
X_{11}											55	43	42	65	73	66
X_{12}												51	57	70	68	85
X_{13}													63	51	60	54
X_{14}														58	57	62
X_{15}															77	94
X_{16}																75
X_{17}																00

Legend of Variables Used in Above Table

X_1 Final score, end of 1f
X_2 Final score, end of 2w
X_3 Pre-course final
X_4 Average of H. P. R. & C. A.T. "Equation Score"
X_5 Honor Point Ratio
X_6 College Ability
X_7 First Hour Exam. 1f
X_8 Second Hour Exam. 1f
X_9 Final Examination 1f
X_{10} Pre-course repeated at end of 1f
X_{11} Pre-course repeated at end of 2w
X_{12} Mid-Quarter Exam. 2w
X_{13} Weekly Quiz 1f
X_{14} Weekly Quiz 2w
X_{15} Final Exam. 2w
X_{16} Average of all objectives 1f
X_{17} Average of all objectives 2w

each of these with the four criteria outlined above (X_6, X_5, X_4, X_1, X_2) we find correlations of .48, .58, .63, and .77 respectively for the first quarter and .43, .55, and .76 respectively for the second quarter. These validity coefficients compare favorably with those found by other investigators with similar materials. There is another fact which stands out with decided clearness. In every instance the objective measures correlate higher with each of the four criteria than do the subjective. Although in some cases the difference is not great, the stability of the trend is such as to warrant the conclusion

that the objective measures are more valid than the subjective ones. It is also evident from these findings that objective measures are decidedly more valid when C. A. T. is used as a criterion than the subjective. This is seen when we consider $r_{6,\ 16} = .48$, and $r_{6,\ 17} = .43$, which are coefficients between the combined objective examinations for each quarter and the college ability test score; and $r_{6,\ 13} = .02$ and $r_{6,\ 14} = .02$, the correlation between the subjective measures and the college ability test scores. Now if we compare the coefficients $r_{5,\ 16} = .58$ and $r_{5,\ 17} = .55$, the sum of the objectives for each quarter and Honor Point Ratio (which is a quality measure of what the student has previously accomplished in college) with those of $r_{5,\ 13} = .49$ and $r_{5,\ 14} = .48$ it is apparent that both the objective and subjective examinations measure something which is involved in success in college as reflected by the Honor Point Ratio. It is also apparent that the objectives have this "something" to a greater degree than do subjectives. Since objectives and subjectives correlate to the extent of .60 for the first quarter and .62 for the second, they are, in part, measuring the same thing. That subjective and objective measures are measuring the same thing is further apparent from the fact that the subjectives correlate only slightly higher with themselves than they do with the objectives. The low correlation between subjective measures and the C. A. T. may be due in a large degree to such factors as the unreliability of scoring such tests, neatness, handwriting and such similar factors as have been shown to influence grading of subjective quizzes, but which do not affect objective examinations. Paterson and Langlie (34), in discussing the influence of sex on scholarship ratings, point out the large part played by factors other than achievement in the determination of college grades. Miller (29, pp. 287) gives further evidence of the lack of objectivity of grades and the part played by factors other than achievement. He made a canvass of teachers' opinions as to what grades represented. He found that marks included teachers' estimates of industry, attitude, improve-

ment, etc., over and above the specific contributions of these traits to subject-matter achievement. Turney (44), working at the University of Minnesota, found similar results.

A large number of studies have shown the correlation between University achievement and so-called intelligence tests to be in the neighborhood of +.50. On the basis of these results, the idea has been accepted by some that ability tests are not a very satisfactory basis for predicting achievement, and that it is doubtful if they really measure academic aptitude to any very great degree. There are two studies which tend to throw doubt upon this hypothesis and place the blame not so much upon the tests as upon the inefficiency of college programs. The first of these studies was conducted by Crawford (7) at Yale. In his study he attempted to isolate the factor of motivation. He used as his criterion of motivation the need for financial assistance. Yale maintains a system of scholarships which reduces the amount of tuition a student must pay in proportion to the grades he earns; those having an average grade of A have all their tuition paid; those of B received two-thirds of their tuition; those having an average of C have to pay only half of their tuition; and those falling below a C average must forfeit their scholarships. When these scholarship groups were compared with a non-scholarship group on the basis of ability and achievement it was found that the correlation for the motivated group was .15 higher than the non-motivated group. Brigham[10] working at West Point, where the hours of study are about equal for all students and where there is a very high degree of motivation, found that the correlation between ability and achievement was in the eighties. The implication seems obvious. The fault lies not so much with our measures of ability as with the inability of colleges and universities to motivate their students to work up to the level of their abilities. Such being the case we should accept results obtained when ability is the

[10] Quoted from a lecture given by Professor D. G. Paterson in Vocational Psychology. The results are not published.

criterion as readily as we accept results from the more orthodox criteria (such as grades). No criterion can be completely satisfactory as long as the inefficiencies of teaching now in existence persist. If this conclusion is valid, then our objective measures are decidedly more valid than the subjective ones, for as we have pointed out the subjctive examinations tend to emphasize the already existing inefficiencies. It is not at all impossible that the subjective examinations are measuring inefficiency of teaching as much or more than they are achievement.

RESULTS AND INTERPRETATIONS OF THE ANALYSIS BASED UPON MEASURES OF ACHIEVEMENT

Table 6 compares the achievement of the two groups under consideration in this section on the basis of the measures of achievement described above. From an examination of the table the following findings are apparent. With respect to *final grades earned in the course one method is as efficient as the other.* Both groups do about the same on the objective examinations the first quarter when the sum of all three objective measures are considered, and, although there is a difference in favor of the lecture-quiz group on these measures the second quarter, it is not statistically significant. The difference in achievement on the subjective examination is slight and inconsistent, favoring the L. Group the first quarter and the L.Q. Group the second. On the pre-course examination the lecture group is slightly superior, but the difference is within the fluctuation which may be expected by chance. At the end of the first quarter this relationship is reversed, although again the difference is small and not statistically significant. The lecture-quiz group apparently learned slightly more, but when we compare the scores made on the same examination at the end of the second quarter the lecture group has forgotten less, but here again the differences are not statistically significant and are probably only the reflection of chance variations. The lecture-quiz group is

TABLE 6

This table contains the results of mean achievement and ability, the differences between the means and the difference divided by the sigma of the difference for the control (L.Q. Group) and the experimental (L. Group). The means are in terms of sigma scores all of which have been reduced to have the mean at 40 and 0 at -4σ

	PSYCHOLOGY 1 (FIRST QUARTER)				PSYCHOLOGY 2W (SECOND QUARTER)			
	Means for L.Q. Group	Means for L. Group	Differences between means	$\frac{D}{\sigma_D}$	Means for L.Q. Group	Means for L. Group	Differences between means	$\frac{D}{\sigma_D}$
Final Score at end of quarter	40.20	40.05	−0.15	0.16	38.50	37.70	−0.80	0.78
Pre-course	36.25	38.50	+2.50	2.29				
Equation Score	39.45	39.45	0.00	0.00				
Honor Point Ratio	39.05	37.75	−1.30	1.19				
College Ability Test	41.10	42.25	+1.15	1.08				
1st Hour Test	39.70	38.80	−0.90	0.85	39.45	36.90	−2.55	2.77
2nd Hour Test	40.05	39.00	−1.05	1.09				
Final Exam.	39.60	39.85	+0.25	0.25	38.80	38.35	−0.45	0.41
Weekly Quizzes	39.55	41.20	+0.65	0.56	39.15	39.00	−0.15	1.40
Sum of all Objective Exams.	40.90	40.55	−0.35	0.35	38.45	37.15	−1.30	1.18
Special Exam.	36.45	35.00	−1.45	1.23	33.00	32.65	−0.35	0.32

superior in previous scholastic attainment as measured by honor point ratio but inferior to the lecture group in ability (C. A. T.). Since the differences are small, they are probably only chance fluctuations. Considering the results as a whole there are no differences which are statistically significant. There is a trend for the control (lecture-quiz) group to be slightly superior to the experimental (lecture) group but this trend is not large, is only moderately consistent, and can have no practical bearing on the question at issue.

From the above findings we may conclude that under the conditions surrounding this experiment there is no difference in the value of the two methods employed.

THE INFLUENCE OF READING MATTER UPON THE EFFECTIVENESS OF ADJACENT ADVERTISEMENTS

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Although the particular position which an ad may occupy within an advertising medium or upon an advertising page has been the subject of numerous investigations, there is one aspect of this question which to our knowledge has been largely neglected. Thus the effect which may be expected from placing an ad near the beginning, at the end or in the mid-region of a series of ads can be predicted with reasonable accuracy;[1] the probable responses which an advertisement will elicit when the number of competing ads is increased or decreased can also be estimated;[2] we have information furthermore on the most desirable locations on a single page;[3] and we know something of the relative values of right- *versus* left-hand pages.[4] In most of our analyses, however, the competition of advertising with near-by reading matter is left unconsidered.

Suppose, for example, a sensational crime story which begins upon page one of a newspaper is continued to an in-

[1] *Cf., e.g.,* D. Starch, *Principles of advertising,* Chicago, Shaw & Co., 1923, 786–89.

[2] E. K. Strong, The effect of length of series upon recognition memory, *Psychol. Rev.,* 1912, 19, 447–62.

[3] H. F. Adams, *Advertising and its mental laws,* New York, Macmillan, 1920, p. 89 ff.

[4] G. B. Hotchkiss & R. B. Franken, *Attention value of advertisements,* Report N. Y. Univ. Bur. Bus. Res., 1920. A. T. Poffenberger, *Psychology in advertising,* Chicago, Shaw & Co., 1925, has an excellent review of the references cited here and of many others also related to these topics.

side page beside a newspaper ad which has no relation whatsoever to the subject or the details of the story. What will be the effect upon the general advertising response of the chance location of the ad beside the news article? Theoretically there are three possible answers to such a question. (1) The greater-than-average time spent by readers of the story upon this particular page and the increase in the number of readers who will turn to the page because of the story, will multiply the attention and memory value of the ad. (2) The interest of the readers in the news story will detract from the normal attention and memory value which the ad might otherwise possess. (3) There will be no effect in either direction. This question in fact may conceivably be of considerable commercial importance. Thus if it can be demonstrated that the location of an ad beside an irrelevant magazine article or story is beneficial to the ad, advertisers instead of specifying particular locations in an advertising section, may specify locations beside the contributions of popular authors. This would have a direct effect upon the adjustment of advertising rates, and magazine publishers at least could notify their clients when particularly desirable reading matter was to be run.[5]

The opinion of applied psychologists, however, seems to be opposed to such a view. We are told by leaders in this field that the "reading attitude" is distinct from the "attitude of looking at advertisements," so that the two are to some extent mutually inhibitory. Munsterberg, whose statement may be taken as representative, is quoted by Poffenberger as follows:[6] "The wish to read a story and to enjoy its contents demands

[5] The problem here is fundamentally distinct from the now common practice of including ads for special commodities in reading sections dealing with relevant subject-matter, as for example financial ads in the financial sections of news publications. In principle the object of these latter arrangements is primarily to place advertising material which is sure to interest readers of the appropriate sections in convenient locations for perusal.

[6] A. T. Poffenberger, *Op. cit.*, 1925, 246–47.

an interest setting which is entirely different from the attitude in which we follow the advertisements, whatever they may be. The one demands the attitude of sympathetic interest by which we lose ourselves in the fate of the hero and heroine; the other appeals to our personal and practical needs and to the wish not to waste our money. The two ways of mental behavior are so different that the one almost excludes the other, and if we are disposed the one way, everything which would demand the other practical disposition must fail to impress us." The ultimate conclusion from such arguments seems to be that the ad must speak for itself and can expect little assistance from adjacent reading material.

THE EXPERIMENT

a. *Problem.* The present study was undertaken therefore to attempt to throw some light one way or the other upon this question. Specifically the problem was to measure the effectiveness in terms of recognition score of ads which were located beside selected articles (known to have been read) in different issues of *The Saturday Evening Post,* as contrasted with ads which were not located beside these articles.

b. *Subjects and procedure.* The subjects were members of three successive classes in the psychology of advertising at Indiana University. Those who followed instructions sufficiently well to furnish reliable data numbered 38, 13 and 34 respectively, a total in all of 85 individuals. For convenience, the subjects were designated as belonging to groups I, II or III, and the results for the different groups were separately treated. Each group was composed of members of both sexes, who for the most part were junior and senior students.

Following the plan used by Hotchkiss and Franken,[7] the *S's* were directed to read a specific article in *The Saturday Evening Post* on Monday night prior to the class meeting Tuesday morning. They were to be prepared sufficiently well on this material to answer questions about it. In addition

[7] G. B. Hotchkiss & R. B. Franken, *Op. cit.*, 1920.

they were to leaf through the rest of the *Post*, spending a few seconds on each page as they might do in any casual survey of it. No other articles or stories were to be read. The material assigned to the first two groups dealt with business and economic questions while that for group III was a popular discussion of recent paleontological discoveries in the Gobi Desert.

The recognition method as employed to test the effectiveness of the ads was regular in all major respects. About 20 full page ads (the number varying slightly from group to group) were shown the subjects for a period of 4 seconds each. Illustrations in all ads were a half page or larger in size. The ads presented to group I contained without exception illustrations of people—mostly in color; those shown group II contained mixed commodity illustrations and pictures of people—some in color; those for group III all had commodity illustrations entirely in black and white. No ads for exceptionally familiar products were among those presented.

Of the ads shown to each group about half (hereafter called "A" ads) were "blinds" which had not previously appeared in recent copies of the *Post*. The remaining ads, all of which were taken from the test issue, were divided into (1) the "B" ads, from parts of the advertising section not near the articles read and (2) the "C" ads which had originally been located on pages opposite the continuation of the assigned reading matter. Each ad was numbered and the subjects indicated on appropriate sheets whether or not they recognized it as having appeared in the particular copy of the *Post* which had been read for the experiment. When the judgment was doubtful, instructions were to make the best possible guess.

RESULTS

a. *General treatment of data.* The findings are summarized in Table I where the recognition figures are given for each group individually. The first column shows the ad category, *i.e.*, whether the ads judged were "blind" (A ads);

whether they were taken from the current *Post* issue but from positions distant from the reading material (B ads); or whether they were originally located adjacent to the article read (C ads). Column 2 gives the number of observers in each group. The total figures in this column are obviously the same regardless of the type of ad judged by the group. Plus and minus recognitions are presented in columns 4 and 5 and are totaled in column 6. The percentages of plus recognitions (figures in column 4 divided by those in column 6) are shown in column 7. The plus recognition per cents for the A ads represent erroneous recognitions, since none of these ads were from the current *Post* issue. They may be taken consequently as an approximate measure of the extent to which guessing took place within the various groups.

TABLE I

Recognition Scores for the 3 Classes of Ads for Each Group

AD CATEGORY (1)	NO. OF SUBJECTS (2)	NO. ADS (3)	TOTAL PLUS RECOGNITIONS (4)	TOTAL MINUS RECOGNITIONS (5)	TOTAL JUDGMENTS (6)	% PLUS RECOGNITIONS (7)
GROUP I						
A	38	9	82	260	342	24.0
B	38	8	176	128	304	57.9
C	38	1	35	3	38	92.1
GROUP II						
A	13	9	26	91	117	22.2
B	13	7	57	34	91	62.6
C	13	3	32	7	39	82.1
GROUP III						
A	34	10	103	237	340	30.3
B	34	8	162	110	272	59.6
C	34	3	74	28	102	72.5

The figures show clearly, however, that the percentages of plus recognitions for the C ads are in all cases considerably larger than those for the B ads. This relationship is maintained for three separate issues of the *Post,* with three entirely distinct groups of subjects who independently read different articles. It holds, moreover, for three selections of advertisements, some of which contained pictures of people (both with and without color) while others had only pictures of objects (also both colored and uncolored). It should be noted at this point that the subjects possessed no knowledge of the purpose of the assignment and could therefore have had no grounds for suspecting a subsequent test of the ads seen, other than the fact that the particular class of which they happened to be members was a class in the psychology of advertising. The evidence seems beyond a doubt to justify the conclusion that the reading of text material near an advertisement markedly increases the effectiveness of that advertisement.

TABLE II

Standard Deviations of the Percentages of Plus Recognitions

GROUP	A ADS		B ADS		C ADS	
	% PLUS RECOGNITION	SD	% PLUS RECOGNITION	SD	% PLUS RECOGNITION	SD
I	24.0	2.31	57.9	2.83	92.1	4.38
II	22.2	3.84	62.6	5.07	82.1	6.14
III	30.3	2.49	59.6	2.98	72.5	4.44

b. *Reliabilities of the differences between per cents.* An objection may be raised, however, with reference to the statistical reliability of the differences between the recognition percentages for the 3 types of ads. Is the increase of the B percentages over the A percentages sufficiently large to be considered significant, or might it be accounted for on the basis of chance factors? To answer this question, the figures in Tables II and III were computed. The first table presents

the respective standard deviations of the per cents as obtained by Yule's formula[8]

$$SD_{\%} = \left(\frac{p \times q}{n}\right)^{\frac{1}{2}}$$

where p is the per cent of plus recognitions, q is the per cent of minus recognitions and n is the number of judgments. Given the *SD*s of the percentages, the standard deviations of the differences in Table III were next obtained. The formula here used was[9]

$$SD_{Diff.} = [(SD_{\%A})^2 + (SD_{\%B})^2]^{\frac{1}{2}}$$

The actual differences between the A and B percentages are shown in column 2 and the corresponding standard deviations of the differences in column 3. Similarly column 5 gives the differences between the B and C per cents and column 6 the *SD*s of the differences. In columns 4 and 7 respectively the differences have been divided by their appropriate *SD*s. As might have been supposed, the figures in column 4 are all much larger than that usually demanded for complete statistical

TABLE III

Reliabilities of the Differences between Plus Recognitions for Differently Located Ads

GROUP (1)	$Diff._{A \text{ and } B}$ (2)	$SD_{Diff.}$ (3)	$\frac{D}{SD_{Diff.}}$ (4)	$Diff._{B \text{ and } C}$ (5)	$SD_{Diff.}$ (6)	$\frac{D}{SD_{Diff.}}$ (7)
I	33.9	3.65	9.28	34.2	5.21	6.56
II	40.4	6.36	6.35	19.5	7.96	2.45
III	29.3	3.88	7.55	12.9	5.35	2.41

[8] G. U. Yule, *An introduction to the theory of statistics*, London, Griffin & Co., 1927, 257–62.

[9] This is an adaptation of the formula usually employed to test the reliability of the difference between the means of two distributions of uncorrelated measures. The formula has numerous other applications, however. In the present instance we have used standard deviations (of the per cents) instead of the more customary PE's. *Cf., e.g.*, K. J. Holzinger, *Statistical methods for students in education*, Chicago, Ginn & Co., 1928, 235 and 240.

reliability (3.00). The element of guessing measured by the A scores is as a result not sufficient to invalidate the larger percentages of the B ads.

The chief interest, however, should center upon column 7 where the reliability of the differences between the B and C ads is tested. In general the figures are by no means as great for these differences as they are for the A–B differences, but they may nevertheless be considered of reasonable significance. Thus the $\frac{D}{SD_{Diff.}}$ value of 2.45 (group II) is great enough to render the obtained difference reliable 993 times in 1000[10]; and the $\frac{D}{SD_{Diff.}}$ value for group III (2.41) is sufficient to consider the obtained difference a "real" one 992 times in 1000. Probably the high figure of 6.56 for group I is to be explained by the fact that only one C ad was used in this case (see Table I). This ad as a result may have possessed other advantages in addition to its location. The possibility of errors of this sort was eliminated in the other two groups by the inclusion of more C ads. Over and above the absolute values of the reliability figures, however, the fact that the findings for each group of subjects again corroborate those of the other two cannot be overlooked.

c. *The effect of interest upon the recognition score.* Before they were given the recognition test, the members of group III were asked to rate the article read in terms of the degree of their interest in it. This was accomplished by means of the following scale:

1. Dull and uninteresting—hard to read.
2. Mildly interesting.
3. Quite interesting—enjoyed reading it.
4. Fascinating—very interesting.

The ratings were almost equally divided between steps 2 and 3. There was no rating of no. 1 and only a single rating of no. 4. The rating for the fourth step was therefore tabulated with

[10] *Cf., e.g.,* H. E. Garrett, *Statistics in psychology and education,* New York, Longmans, Green, 1926, 91.

those of step 3 so that the whole group of 34 judges (making up group III) was split into two sections which for the present purposes may be designated as "interested" and "uninterested."

TABLE IV

Recognition scores for interested vs. uninterested subjects

AD CATEGORY	UNINTERESTED % Plus	UNINTERESTED % Minus	INTERESTED % Plus	INTERESTED % Minus
A	23.8	76.2	32.3	67.7
B	57.8	42.2	60.1	39.9
C	66.7	33.3	74.4	25.6

The separate treatment of their results gave the figures in Table IV. By comparing the percentages of plus recognitions of the C ads for the interested and uninterested subjects, as shown in this table, we have a crude measure of the influence of the degree of interest in the material read upon the effectiveness of the adjacent ads. Thus it may be seen that the average percentage of the plus recognitions (C ads) for the interested subjects is 74.4, while that for the uninterested subjects is 66.7. Are we to conclude from these figures that the greater one's interest in an article or story, the more likely he will be to notice the ad next to it? The results, it seems to us, hardly justify such a statement, although there is some indication that it may be true. In the case of the C ads, the plus recognition score is nearly 8 per cent higher for the interested subjects, whereas it is only about 2 per cent higher for the B ads. The difference of 6 per cent might be regarded as important were it not for the fact that there is nearly 9 per cent more guessing among the interested persons as shown by their scores for the A ads. If a correction of 9 per cent is subtracted from the C percentage of the interested readers, those uninterested then have the advantage. Our results on this point, therefore, are hardly comprehensive enough to permit valid conclusions in either direction. The problem in-

volved is suggestive, however, and would undoubtedly merit further investigation.

SUMMARY AND CONCLUSIONS

Eighty-five subjects divided into three groups of 38, 13 and 34 respectively were required to read at different times a single article in current issues of *The Saturday Evening Post*. They also leafed through the magazine looking at every page for a few seconds but reading nothing more than the assigned material. They were subsequently tested for their recognition of ads appearing in the *Post* in question.

1. The recognition scores were highest for those ads which had originally been located beside continuations of the articles read.

2. The differences between the recognition per cents of the ads located beside the reading matter and the recognition per cents of the ads in other positions possessed a high degree of statistical significance.

3. The findings were the same for the three independent groups of subjects, the members of which read different stories and were tested with different ads.

4. The results are opposed to the psychological supposition that the "reading attitude" is incommensurate with the "attitude of looking at advertisements."

5. They suggest further that in addition to considering the location of a particular ad with reference to competing ads, and in addition to considering its location on a page, its position in relation to reading material should also be taken into account. It is possible indeed that an otherwise inferior location in a medium may prove to be a superior one if the story of a popular author is continued beside the poorly placed ad.

6. Attempts to determine the influence of the degree of interest in the reading matter upon the recognition score of adjacent advertisements were largely inconclusive. It is suggested, however, that further investigation in this direction would prove fruitful.

RELATION BETWEEN INTEREST AND ACHIEVEMENT

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It is a commonly accepted fact now that success in any field of endeavor is the function of two variables, interest and ability. Thus the task of vocational guidance resolves itself into determining by means of tests the occupations for which an individual possesses proper amounts of these requisites to insure success in them. One can readily see that this involves a complicated procedure, for every type of occupation must be considered. If a definite relationship can be demonstrated to exist between interest and ability so that the presence of the former will indicate that of the latter and vice versa, it is obvious that the work of vocational guidance is reduced to half since only one of the essentials for success in an occupation need be tested for. It is the purpose of this study to discover whether such a relationship is present when interest and ability in high school subjects are considered.

Throughout the discussion which follows vocational guidance is assumed to include educational guidance. This is not without basis for Fryer[1] has shown that in general what is true for one is also true for the other.

The general procedure followed in this experiment was first to have a group of high school students select from all the courses taken by them during three and one half years those of first and second interest and their corresponding antitheses. This was accomplished by means of the questionnaire described below. Then, using the school records of these students a correlation between the average grade received during

[1] Fryer, D., Interest and ability in Educational Guidance. J. of Educ. Res., 1927, vol. 16, p. 27.

three and one half years for each of the above courses and the average grade received in all remaining courses combined, for each case during the same period, was determined. Thus the average grade for the course of greatest interest was compared with the average grade received in all the other courses combined; similarly the average grade for the course of second interest was compared with the average grade in all other courses combined, etc. These correlations represent relationships for the group as a whole.

Relationships between the same categories were also determined graphically and by the difference method. All the above statistical treatment is herein later discussed in detail.

The test subjects for this study were a group of 150 high school seniors; more specifically, those students who were completing the last half of the fourth year, the "senior A division." Both sexes were included as well as all curricula, i.e., commercial course, college preparatory course, etc., thus insuring a fair sampling. Seniors were chosen because they had completed practically all their courses and the average grades obtained were practically as representative as those that would obtain after the remaining half year was completed.

The discrepancies found in the number of students' data used for each of the four correlations, i.e., 143 in the case of the first interest correlation, 136 for that of the second interest etc., (see Graphs) is due to the fact that in a number of cases degree of interest was expressed for courses which were being taken at the time that the questionnaire was presented. A warning against this error was given (see Questionnaire). However, where the mistake occurred the results could not be used since no grades were obtainable at the time for those courses. The error occurred most frequently in the case of courses disliked, which seems to indicate that recency may affect the attitude toward a course disliked more than that toward a course liked.

As I have already mentioned, the purpose of the questionnaire was to have the student indicate the courses (1) "which I like best," (2) "which I like second best," (3) "which I dislike most," and (4) "which I dislike next as much," of those which he had already taken in high school. However in the presentation of these questions there were various factors to be considered. These I wish to discuss at this point.

Only those courses already taken were considered because the student can more readily and correctly estimate his interest in courses the contents of which are known to him than in those of which he has merely preconceived ideas—more likely to be fallacious than not. Thus a student may enter a course in chemistry believing that the work consists entirely in the setting up of apparatus and mixing of reagents in a laboratory only to find to his amazement that just as much, if not more, of the work is of a mathematical nature and performed with pencil and paper in a classroom. In the future,

Name .....

Course (tech., comm., etc.) .....

Below is given a list of high school subjects. Considering *ONLY THOSE WHICH YOU HAVE ALREADY TAKEN,* pick out that subject *WHICH YOU LIKE BEST,* in fact, so much so, that you would like it to represent a major part of the work of your job or profession, when you leave school. For instance, if you like bookkeeping so much that you want your occupation, when you leave school, to consist mainly of bookkeeping, record that as the subject which you like best, etc. Choose also the subject which you like second best, in the same way as above.

Do not let your choice be influenced by grades received or attitude toward certain teachers. Choose those subjects which you *HONESTLY BELIEVE YOU LIKE BEST, REGARDLESS OF THE GRADES WHICH YOU HAVE RECEIVED* in the subjects which you choose.

Spaces are supplied at the bottom of the page for recording the subjects that you like best and next best.

From the same list and in the same manner as above, select the subject which you dislike most, and do not care to have anything to do with when you leave school. Also select the course which ranks second in

your dislike. Record them in the spaces supplied for the purpose at the bottom of the page.

Look through the entire list before making selections.

English	Stenography	Elem. Physics and Chem.
Algebra	Typewriting	
French	Solid Geometry and Trig.	Music Fund.
Spanish		Design
German	Civics	Voice Cult.
Chemistry	World History	Home Chemistry
Physics	Bus. Arithmetic	Inter. Decorating
Latin	Bookkeeping	Home Math.
Geometry	Economics	Harmony
Ancient History	Office Methods	Cloth and Text.
Domestic Science	Commercial Law	Drafting
Mech. Drawing	Biology	Elem. Mechanics
Fine Art	Gen. Math.	
Music Appre.	Applied Art	
Modern History	Comm. Geo.	
Amer. Hist. and Civ.	Comm. Civics	

The subject which I like best is .....

The subject which I like second best is .....

The subject which I dislike most is .....

The subject which I dislike next as much is .....

when vocational guidance questionnaires for interest are constructed they will have to be objective and extensive, containing elements characteristic of all types of work, in order that the type of work in which the individual tested is most interested may be discovered. A person's report of different degrees of interest in diverse occupations is of little diagnostic value for vocational guidance unless he knows the kind of work which each type of occupation represents, either through past experience as is demonstrated in the questionnaire which was used in this study, or for prediction, which is the more important, through an objective test similar in principle to that mentioned above.

There is a rather strong tendency to confuse interest with ability.[2] In order to avoid any error that might have arisen from this source (a) I directed the student to leave grades out of his considerations, but more important (b) projected the rating of courses for interest into the future. The former requires no discussion. The device used for the latter was to have the student consider the courses above in the light of the type of occupation which he would like or dislike to follow when he leaves school. The assumption was that when he makes his selections on this basis, the student is dreaming of the future, at which time he *hopes* to be his sole master and consequently choose to do *what* he will, rather than centering his attention upon the present with its thoughts concentrated on passing, graduating and perhaps getting good enough grades to enter college, all questions of ability. So, we see, that by projecting it into the future, the rating of degrees of interest in courses taken is less likely to be influenced by ability in them, as judged from grades received in them. In considering our own dreams of the future we can readily see how unhampered they are by considerations of ability and how they are guided solely by our likes or dislikes. Reaction to the personality of the teacher was warned against in making selections, for there are many instances where the attitude of the student towards the teacher of a course molds his attitude toward the course itself.

A list of all the courses given in the high school was supplied in the questionnaire from which of those already taken the student could make his selections. The principle supporting this procedure was that of the relative efficiency of recognition and recall. The former being far more efficient, presentation of the list avoided the possibility of a course being omitted from consideration due to incomplete recall of all those taken. The student was not limited to certain specific courses in making his selections of relative interest, as we find

[2] In this report it is assumed that achievement in school work is a measure of ability.

is the case of other experiments in this field. All courses taken were considered. The fault found with the former method is that when an individual is asked to rank for interest a group of courses none of which particularly interest him, the road is opened for many errors in judgment. Since specific attitudes are required where none exist for the individual selections are guided almost entirely by fickle chance. It has been the custom not only to limit the courses from which selections must be made to certain specific ones, as I have just mentioned, but also to have the subject rank them all for interest relatively, i.e.,—1st, 2nd, 3rd, 4th, 5th, etc. The present study has removed this difficulty in ranking to a great extent by asking only for the 1st and 2nd degrees of like and dislike. This method is more likely to result in accurate selections because only the expressions of the extremes of interest are considered and not the many intermediate degrees, expression of which are guided largely by chance. The graphs on the last pages of this study demonstrate how much the variability of results increases when we move just one step from each extreme, viz., from 1st to 2nd like and from 1st to 2nd dislike. As we move farther from the extremes, we may expect that the expressions of interest will give more variable and hence less reliable results. So it is evident that by asking for the extreme degrees of interest only, we get more reliable results than those obtained when the expressions of intermediate are also considered.

The scale of grades used in the high school at which this study was made follows: failure—x, 78, 84, 91, 97,—with the intermediate plus and minus ratings. The grade 78 – represents a condition. In order to simplify calculations and consider the plus and minus degree of each grade as a separate one, as the case should always be, the above scale was transposed into one ranging from 0–13, where *0* represented a failure, *1* a condition, *2* a 78, *3* a 78 plus, *4* an 84 –, *5* an 84, etc.

Using this scale, the average grade received during three and one half years in the course representing each of the four degrees of interest was computed. Likewise, the corresponding average grades received for all other courses combined were determined. Thus, for each student we had the following groups of data, for each of which a relationship was determined for the group as a whole, by the three methods mentioned: (a) the average grade received in the course liked best and the average grade received in all other courses combined; (b) the average grade received in the course liked second best and the average grade received in all other courses combined; (c) and (d) similar data for the courses disliked most and next as much, respectively.

By means of the product-moment method correlations were determined for the four categories mentioned above. In the case (a) r was found to be $+0.60 \pm .04$, which according to Garrett[3] "denotes a substantial or marked relationship." Thus we may say that when a student likes a certain course best it is a definite indication that his ability in that course is above his average ability for the high school work. There are two factors which make this conclusion reliable: first, the P.E. is extremely small, $\pm .04$; and secondly, in 80 per cent of the cases the average grade in the course liked best is higher than the average grade of all the other courses combined, indicating a low degree of variability.

For group (b) r was found to be $+0.49 \pm .04$. This is a further indication of the close relationship between interest and ability for we see that as the degree of interest wanes so does ability. While the course which a student "likes second best" is not as closely related to ability as that which he "likes best," as we should expect, yet the correlation-coefficient $+0.49$ is an indication of decided relationship between interest and ability, making even this second degree of interest prognostic to some extent. This result is also accom-

[3] Garrett, H. E., Statistics in Psychology and Education, 1926, p. 298.

panied by a very low P.E., $\pm .04$. The fact that only 59 per cent of the subjects showed a higher average grade in the course liked second best than that in all other courses combined, bears out my previous statement that as degrees of interest move from the extremes, variability of the relationships increases and hence their reliability decreases.

Correlation-coefficients of $+0.58 \pm .04$ and $+0.57 \pm .04$ were found for the components of (c) and (d) above, respectively. These results indicate that dislike of a course runs hand in hand with lack of ability in that course. The same small P.E., $\pm .04$, was found in both cases. As in the case of categories (a) and (b) variability increases as we move from the extremes of interest, for in the case of (c) 83 per cent of the cases show lower average grades in the courses disliked most than in all other courses combined; in (d) 66 per cent of the cases show this tendency. Except for the closeness of the correlation-coefficients, the results found in (c) and (d) are almost identical, basically, with those obtained for (a) and (b), each pair thus serving as a check on the other concerning the conclusions reached on the relationship between interest and ability. I believe that the equalizing factor of the correlation-coefficients found in (c) and (d) is to be found in the peculiar attitude of the student group as a whole toward certain courses. In a large number of cases Latin was the course most disliked even though high grades were received in it, which is probably due to the fact that it is approached as a course that will never be of any practical use to the student. Such high grades appearing among those of the courses most disliked tend to make the correlation-coefficient of (c) lower and thus more like that of (d), just as low grades among the courses most liked would tend to bring the r for (a) closer to that of (b), since the correlation of interest and ability becomes lower as well as the relationship more variable.

Table 1 below gives at a glance the results discussed above.

TABLE 1
Average grade in all other courses combined

	r	P.E.	CASES	
			Above	Below
Grade in course liked best	+0.60	± .04	80%	
Grade in course liked second best	+0.49	± .04	59%	
Grade in course disliked most	+0.58	± .04		83%
Grade in course disliked next as much	+0.57	± .04		66%

The relationships between the grades received in the courses representing the four degrees of interest indicated in the questionnaire and the respective grades in all other courses combined were also determined by finding the average difference in grade between them. Thus, the average difference between the grade received in the course liked best and the grade received in all other courses combined was determined for the group, etc.

The average difference between the grade in the course liked best and that of all other courses combined was found to be 1.86 in favor of the former, when the scale of this study was used (see p. 7)—which is approximately 5 points in the high school's grading scale. This shows just how much more ability, in terms of grades, the student exhibits in the course which he likes best than his average for high school work. When $\frac{D}{\sigma_{diff.}} = 3$, a high reliability is indicated and anything greater than 3 indicates just so much added reliability. Since $\frac{D}{\sigma_{diff.}}$ for the above result is 10, the average difference is seen to be extremely reliable. Similarly, the grade of the course of second interest was found to average .73 points (in the scale of this study) higher than the grade for all other courses combined (average ability for school work). This

result was also shown to be reliable $\left(\frac{D}{\sigma_{diff.}} = 3\right)$. This clearly indicates that greater than average ability is shown in the course liked second best. Again, as was the case in the study with correlation-coefficients (see (a) above) decrease in interest is accompanied by decrease in ability as well as reliability.

An average decrease from the grade in all other courses combined of 1.77 points and .95 points was found when the courses disliked most and next as much, respectively, were considered by the same method. The respective reliabilities were 8.9 and 5, showing the increase in variability as we move from expressions of the extreme interests. These results indicate that much less than the average ability is shown in the courses disliked. Throughout, the difference method results corroborate those obtained by the correlation method. See Table 2 below.

TABLE 2

	POINTS	$\frac{D}{\sigma_{diff.}}$	$\sigma_{diff.}$
Grade in course liked best minus grade in all other courses combined	1.86	10.0	.17
Grade in course liked second best minus grade in all other courses combined	.73	3.0	.21
Grade in course disliked most minus grade in all other courses combined	−1.77	8.9	.20
Grade in course disliked next as much minus grade in all other courses combined	−0.95	5 0	.19

The results of this study may be summarized as follows:

1. The degree of relationship between ability in high school courses "liked best," "liked second best," "disliked most," "disliked next as much," and average ability for high school courses is expressed by the correlation-coefficients $+0.60 \pm .04$, $+0.49 \pm .04$, $+0.58 \pm .04$, and $+0.57 \pm 04$, when the data obtained from 150 high school seniors is considered. Thus, a "substantial and marked relationship" is

shown to exist between interest and ability, at least in high school courses.

2. A study of the average difference between the grade received in the course "liked best" and the grade in all other courses combined showed the former to be 1.86 points higher. The grade in the course "liked second best" averaged .73 points higher. Similar relationships determined for the courses "disliked most" and "disliked next as much" showed their grades to be 1.77 and .95 points lower, respectively, than that for all other courses combined. This corroborates the results obtained in (1) above.

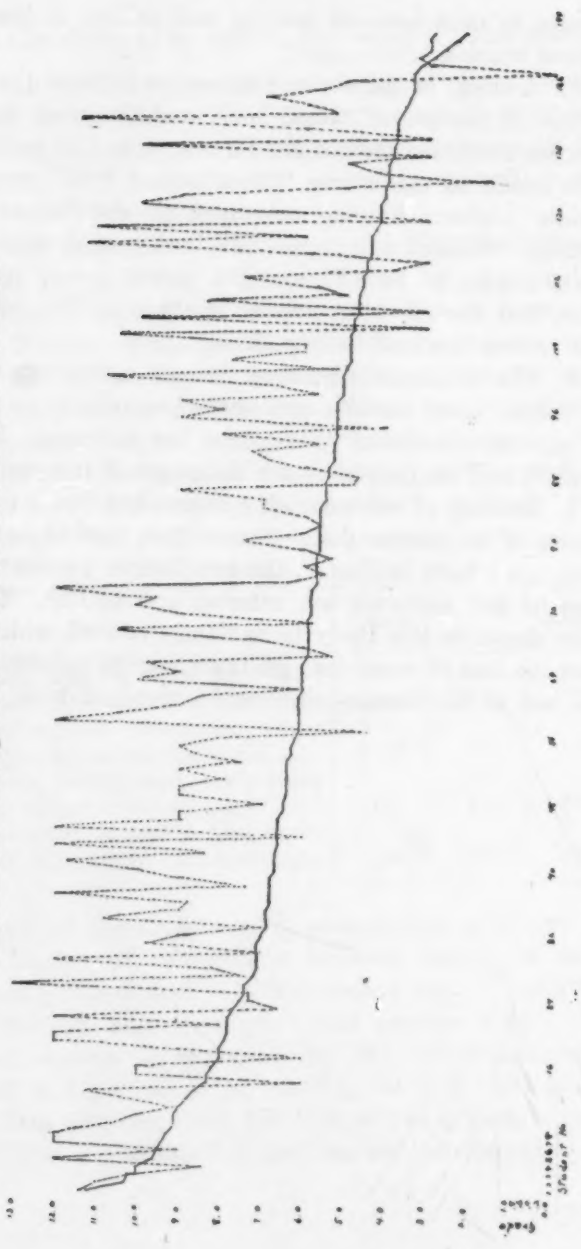
3. The relationship between interest and ability was found to become more variable and hence less reliable as the degree of interest considered moved from the extremes. See Tables 1 and 2 and the graphs on the last pages of this study.

4. Recency of contact with a course was found to affect the choice of the courses disliked more than that of courses liked.

5. As I have indicated, the two factors necessary for success in any endeavor are interest and ability. These have been shown in this study to be closely related, which suggests that the task of vocational guidance may be reduced to testing for one of the factors—interest—instead of both.

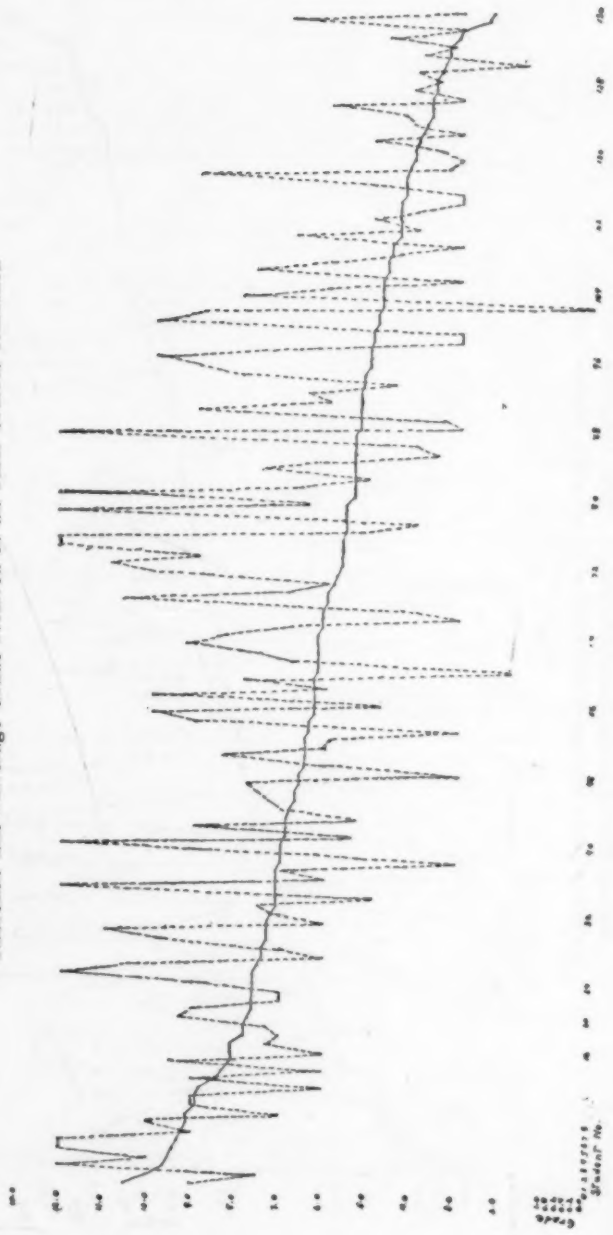
GRAPH 1

Broken line = Average Grade received in course "liked best"
Unbroken line = Average Grade received in all other courses combined



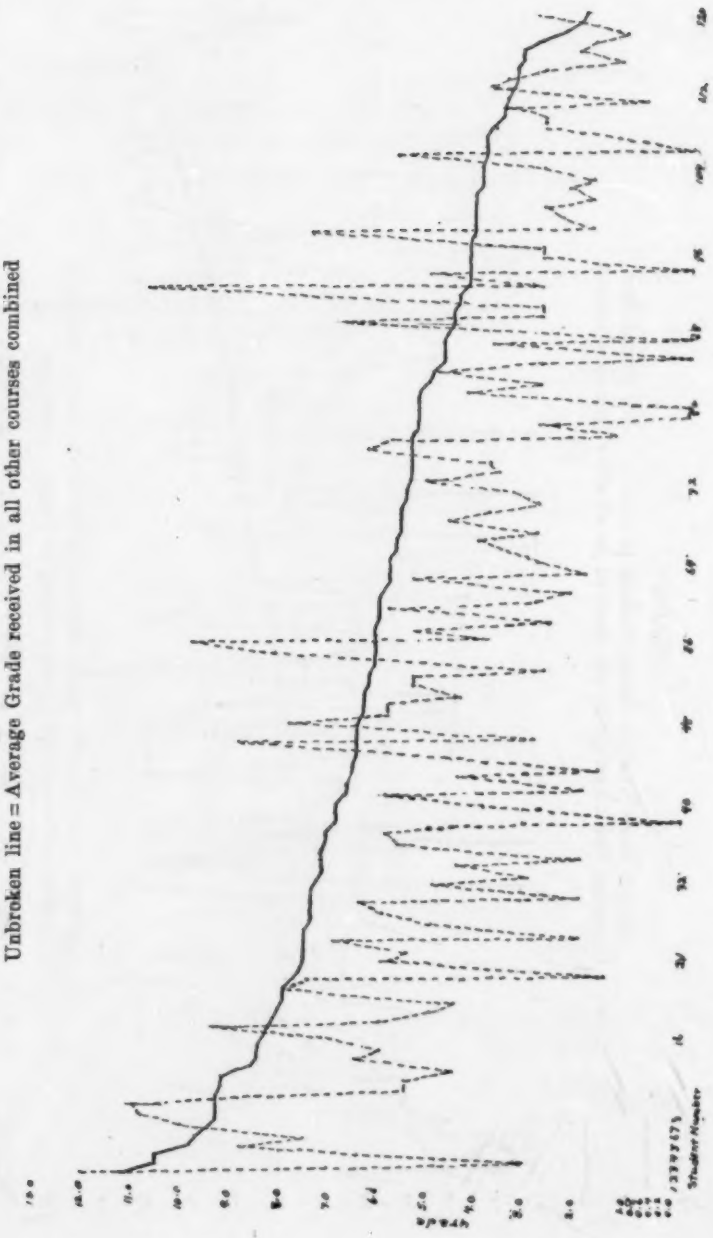
GRAPH 2

Broken line = Average Grade received in course "liked second best"
Unbroken line = Average Grade received in all other courses combined



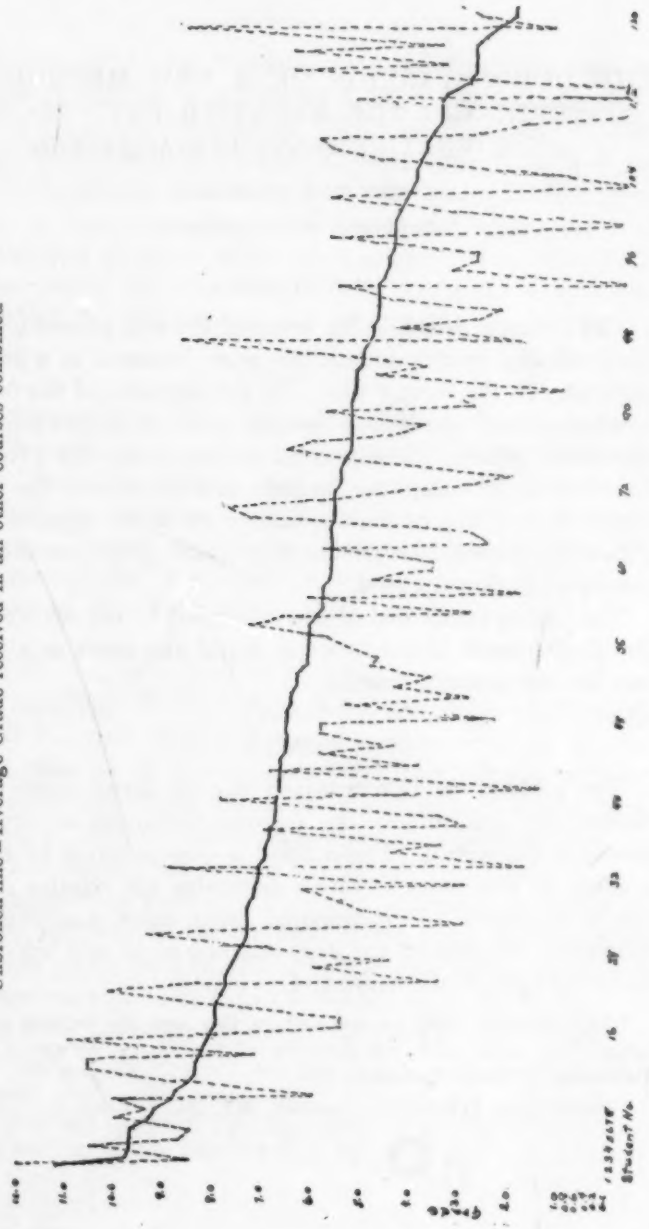
GRAPH 3

Broken line = Average Grade received in course "disliked most"
Unbroken line = Average Grade received in all other courses combined



GRAPH 4

Broken line = Average Grade received in course "disliked next as much"
Unbroken line = Average Grade received in all other courses combined



THE DEMONSTRATION OF A NEW METHOD FOR DETERMINING THE RELATIVE EFFICIENCIES OF ADVERTISEMENTS IN MAGAZINES*

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INTRODUCTION

The formula, which is the heart of the new procedure to be demonstrated in this article, has been discussed in a previous article.[1] In the former work, the development of the formula was traced and discussions given to show its adequateness and particular worth. The present article gives the procedure followed in studying the formula and interprets the results which were obtained in the rather extensive studies made. This article should be prefaced by reading the previous discussions mentioned above.

The bibliography which was appended to the article about the development of the formula would also serve as a proper one for this present treatise.

PROBLEM

The problem in this research was to demonstrate a new method for determining the relative efficiencies of advertisements in magazines. The method is demonstrated by making a study of some factors which determine the relative efficiencies of magazine advertisements. Size, color, position in the magazine, position on the page and the right and left factors were the main features studied.

* The research which is reported in this and the related previous article was done under the direction of Dr. Harry W. Crane at the University of North Carolina.

[1] JOURNAL OF APPLIED PSYCHOLOGY, XV, No. 4, 390.

MATERIALS

Five numbers of the *Saturday Evening Post* were used in the experiments, issues of October 4, 1919; January 16, 1926; January 22, 1927; January 29, 1927, and February 5, 1927. Except for the issue of October 4, 1919, which was used the day it went on sale, these magazines were secured before they went on sale at the regular news stands and before they had come through the mails or by other means to the subscribers. In other words, the experiments were conducted with magazines which the subjects had not seen at all.

SUBJECTS

The subjects were students in the first and second courses in psychology given at the University of North Carolina and at Ohio State University, except for one group which was a class studying money and banking at the University of North Carolina. The fact that the subjects were selected from different generations of students in different parts of the country ought to make them fairly representative.

PROCEDURE

The *Saturday Evening Posts* were brought into the classroom at the time when the students were entering for the regular class which was scheduled for that particular hour. The regular instructor informed the class that it had been arranged to have them cooperate in a bit of psychological research and asked them to give their intelligent cooperation.

The magazines were distributed to the subjects who were asked to let them lie on the arm of the chair face up until they were given instructions as to the manner of procedure. The experimenter then gave the following instructions:

Place your *Saturday Evening Post* before you face up.

> When I say "turn" you are to turn back the front cover.
>
> You are to spend the time until I next say "turn" in looking at the two exposed pages in any way that

interests you—trying, however, to do it in as natural a manner as you would if you were seated in your own room.

Please turn to the next page promptly each time that the signal "turn" is given.

Each time, as soon as you have turned the page, let the thumb and forefinger of the right hand take hold of the upper right hand corner of the right-hand page, so that you will be prepared to turn it promptly at the next signal.

Pay no attention to your neighbors.

The time of exposure for each two pages, and also for the back cover, was fifteen seconds. The time was kept by a stop watch in the hands of the experimenter who called the signals to turn at the close of each period.

After the subjects had turned through the magazines they were asked to turn them face up on the arms of the chairs. The magazines were then taken up and placed where the subjects had no opportunity to view them. Immediately following this procedure university quiz books were given to the subjects.

Each subject was requested to write his name, age to the nearest birthday, classification in the University and the date of the experiment, on the front cover of the quiz book. When this preliminary work was completed, the following instructions were given to the subjects:

Write down as quickly as possible all the advertisements that you can recall, being sure to write them down just as you happen to remember them. About each advertisement recalled try to give as accurately as possible the following two things and in the order named:

1. The definite name of the article advertised.
   For example, not just fly-paper, but, Tanglefoot Flypaper. If there is no definite trade name as in the example, do not put just dog biscuit, but Martin's Dog Biscuit.
2. State briefly the one thing in the advertisement that most stands out for you.

At the close of periods ranging for the different groups from about sixteen to twenty-two minutes, time was called and the writing ceased.

In order to discover any who had had the experiment before or who had heard of the experiment and to otherwise standardize the books, the following questions were asked and answered:

1. Have you written all you could?
2. Have you had the experiment before this time?
3. Had you heard of the experiment?
4. Had you seen this number of the *Post* before coming to class?
5. Have you had or are you taking a course in advertising?
6. Did you finish on time, before or after the time called?

The answering of these questions completed the part played by the subjects.

RESULTS

The data collected for this paper may be used for further study along the same lines herein pursued. As the work now stands it represents a treatment of the reactions of 291 subjects who observed one of five different magazines. A total of 7,465 recalls was secured, of which 7,037 were used in the main body of this paper. One hundred and twenty-three of the recalls, which for various reasons had to be thrown out, were used in tables showing the advertisements recalled as if in the magazines when they really were not there. The remaining 305 recalls were irrelevant and not usable, *i.e.*, not specific, second recall of the same advertisement, etc.

In compiling the data, the recalls written in the quiz books were numbered in serial order. The advertisements in the *Posts* were given numbers in order of occurrence from front to back. The recalls in the quiz books were then identified and given the proper numbers from the *Posts*. In order to get the total number of recalls and the sum of the ranks of recalls for each advertisement, all the recalls in the quiz books

which could be identified with certainty were distributed on large sheets of ruled paper. The number of the advertisement was indicated in a vertical column at the left and the rank of recall in a horizontal column at the top of the sheet.

The indices of efficiency of the various advertisements were then found by employing the following formula:

$$\frac{N^2}{\text{Sum } R} \times \frac{100}{gn} = E$$

N = Number of recalls
R = Rank of recalls
E = Efficiency
gn = Group number

The manner in which the formula is applied is explained below:

To get the sum of the ranks, multiply the rank of recall by the number of recalls under that rank and take the sum of the products. Thus suppose we have a group of one hundred subjects and that in the column for advertisement number four there are three places where it is recalled—3, 6, and 9. Under rank three there are three recalls, under rank six two recalls, and under rank 9 one recall. The sum of the ranks would then be

$$(3 \times 3) + (2 \times 6) + (1 \times 9) = 9 + 12 + 9 = 30$$

The number of recalls would be $3 + 2 + 1 = 6$. We would then substitute in the formula as follows:

$$E = \frac{(6)^2}{30} \times \frac{100}{100} = \frac{36}{30} = 1.2000$$

The indices of efficiency of the various advertisements were transferred from the large distribution sheets to the smaller sheets on which the data were tabulated, as will be shown in the following pages.

It will be noted that we did not use the GK^2 as developed

[2] This GK stands for "Group Constant." It is a factor in a different statement of the formula used in this work. This other statement

in a former article on this new method. It was concluded undesirable to consider the factor of size of the advertising section in determining the relative efficiencies of the advertisements studied in this work. In the first place, by using the variations based on the results obtained by Strong and others we would run the risk of distorting the results more than correcting them. The variations as determined by the mentioned experimenters depend upon the per cent of recall and do not take into account the rank of recall. If the values based on Strong's work were used to correct the indices of efficiency of the advertisements studied in this work there would be little difference in the end results. The indices given the advertisements in three out of five of the groups studied, vary from what they would be when corrected according to the suggested formula only one or less than one per cent. In the other two groups the indices vary from what they would be if the factor of size of the advertising section were considered by not more than six per cent and not less than four per cent. It will be seen thus that the deviation in most cases is in the second decimal place. Moreover, since we are making comparisons of the averages of the indices of advertisements taken from all the different magazines, and not making comparisons of indices of advertisements taken from any one magazine with those of advertisements taken from another, what differences there may be are, as a whole or in part, negated by the compensations accomplished in the tables of comparisons.

It should be noted at this point that the numbers of advertisements in the five magazines used in the experiments to secure the data for this work were as follows:

January 22, 1927	98
January 29, 1927	105

of the formula which was developed in a previous work renders results in terms of a standard group of advertisements and in terms of a standard group of subjects. The GK is the standard element in the formula. All the values in the GK have not been determined by the method employed in this paper. It was developed in theory from results taken from the experimenters mentioned.

January 16, 1926	111
October 4, 1919	123
February 5, 1927	129

These numbers do not include the advertisements of the size of one eighth page or less.

METHOD FOR THE COMPILATION OF THE *Saturday Evening Post* DATA

The compilations were made for all the advertisements appearing in the given issues of the magazine. They were made on one-fourth inch cross-section paper ruled and headed as noted below; twenty-five advertisements were placed on each sheet. The following explanation of the column headings on the cross-ruled paper will enable the reader to understand just what was put in each column.

1. Number of the advertisement—number of the advertisement as it appeared in the magazine.
2. Order of recall—not filled in.
3. Character of the material on the opposite page.
4. Character of the material appearing on the same page.

Size of the Advertisements

5. Double spread.

Left Hand Page

6. Full page—a check in this column indicated that the advertisement occupied the entire left-hand page.

Half Page

7. Vertical left—a check in this column indicated that the advertisement occupied the vertical left half of the page.
8. Vertical right—vertical right half of the page.
9. Horizontal upper—upper half of the page.
10. Horizontal lower—lower half of the page.

Quarter Page

11. Upper left—the upper left-hand quarter of the page.
12. Upper right—the upper right-hand quarter of the page.
13. Lower left—lower left-hand quarter of the page.
14. Lower right—the lower right-hand quarter of the page.
15. Marginal left—the outside column on the left of the page.
16. Marginal right—the outside column on the right side of the page.

Eighth Page

17. Marginal left upper—the upper half of the left outside column.
18. Marginal left lower—the lower half of the left outside column.
19. Marginal right upper—the upper half of the right outside column.
20. Marginal right lower—the lower half of the right outside column.
21. Other advertisements having sizes other than those already specified. The exact proportion of the page which the advertisement occupied was stated in this column.
22. Color—a check in this column indicated that the advertisement was colored.

A space was also provided on the page for the indices of efficiency of the advertisements.

Key by which the material in the magazines was tabulated—

1. Pictures—humorous.
2. Pictures—non-humorous.
3. Poetry.
4. The beginning of an article.
5. The beginning of a story.
6. Full page advertisement, illustrated.
7. Full page advertisement, unillustrated.
8. One half page, illustrated.
9. One half page, unillustrated.
10. Reading matter without heading.
11. Reading matter—continuation of a story or an article, but with a heading.
12. One fourth page advertisement or advertisements, illustrated.
13. One fourth page advertisement or advertisements, unillustrated.

The above numbers were used in tabulating the material on the same page with the advertisement and on the page opposite the advertisement.

GENERAL METHOD OF CLASSIFYING THE ADVERTISEMENTS

In order to demonstrate the various factors involved in determining the efficiencies of advertisements, efforts were made to classify the advertisements in such a way as to make possible a comparison between the averages of groups which differed mainly in the use of one particular advertising device; *e.g.*, colored or non-colored, right or left, etc. It was very difficult to establish definite highly selective standards and still secure groups large enough to make a valid comparison.

The complexity of the material used made it impracticable to extend the distinctions beyond the use and non-use of color, size, position on the page, position in the magazine, class of material on the same page, class of material on the opposite page, illustrated and non-illustrated, and the right and left factor. Distinctions of a somewhat finer sort were not made on the basis of the kind, size and style of type used, the general structure of the advertisement (use of border, balance, use of lines, etc.), kinds of arguments used, amount of white space, the relative amounts of space devoted to copy and illustration, etc. Some of the advertisements did not fall into the classifications made and had to be left out.

Only the advertisements in which color was clearly an effective part were classed as colored advertisements. The selection was made on the basis of judgments passed by five men with some background of study in psychology of advertising. Those advertisements which were given two or more checks to indicate that they should not be classed with the colored ones were thrown out.

TABLES OF DATA

Tables of data were made of the advertisements classified as mentioned above. The averages of the indices of efficiency were used for making the comparisons. These tables of data are not included in this article, but a summary of the extensive comparisons made is given on the pages following.[3]

GENERAL SUMMARY—SIZE

1. Colored double spreads
   - 1.73 to 2.15 times as efficient as the left colored full page.
   - 2.07 to 3.76 " " " " " right " " "

[3] The method developed in this work, as the reader will note, has been under consideration for a number of years. The method and the data collected in making a study of it have not been made public earlier because it was thought best to secure a large amount of data before conclusions were drawn, and because a thorough study of the method had not been completed previous to this time.

Colored full pages just inside the front cover 2.84 times as efficient as the colored double spreads.

2. Uncolored double spreads
   1.31 to 5.53 times as efficient as the left full page uncolored advertisements.
   1.05 to 3.23 times as efficient as the right full page uncolored advertisements.
   Uncolored left full pages just inside the front cover 1.57 times as efficient as the double spreads.
3. Uncolored left full page advertisements
   2.05 times as efficient as quarter pages marginal left.
   2.49 " " " " " " upper left.
   3.56 " " " " " " lower left.
   1.50 " " " " vertical left half pages.
4. Uncolored right full page advertisements
   1.73 times as efficient as quarter pages upper right.
   2.91 " " " " " " lower right.
   1.78 " " " " vertical right half pages.
5. Vertical left half page advertisements[4]
   1.41 times as efficient as quarter pages marginal left.
6. Vertical right half page advertisements
   1.77 times as efficient as quarter pages lower right.
   1.05 " " " " " " upper right.

GENERAL SUMMARY—COLOR

1. Colored double spreads
   1.03 times as efficient as uncolored double spreads.
   1.10 " " " " slightly colored double spreads.
2. Colored full pages opposite uncolored full pages—colored 1.86 times as efficient as uncolored full pages opposite colored full pages in the front of the magazine, and 1.22 times as efficient as the uncolored in the back of the magazine.
3. Colored left full pages
   1.76 to 2.64 times as efficient as the uncolored left full pages.
4. Colored right full pages
   Uncolored right full pages 1.03 to 1.92 times as efficient as the colored right full pages.
5. Effect of colored and uncolored full page advertisements on smaller advertisements which occurred opposite them

[4] The quarter and half pages described as "right" were all on the right page, and all those described as "left" were on the left page.

Quarter page marginal left advertisements opposite uncolored full pages 1.29 times as efficient as quarter pages marginal left opposite colored full page advertisements.

GENERAL SUMMARY—POSITION IN THE MAGAZINE

1. Colored double spreads
   Front group 1.96 times as efficient as the middle group.
2. Colored full pages
   Front group[5] of right full pages 1.99 times as efficient as the middle group. Front group of left full pages 1.64 times as efficient as the last group.
3. Uncolored full pages
   Front groups 2.30 to 2.49 times as efficient as the last groups. One back group 1.16 times as efficient as a middle group.
4. Half page vertical left opposite full page uncolored advertisements
   Front group 2.21 times as efficient as the last group.
5. Right full page uncolored advertisements opposite tables of contents —full pages opposite other matter 1.78 to 2.46 times as efficient as those opposite the table of contents.
6. Half page advertisements on page with table of contents
   1.92 times as efficient as half pages similarly placed except for the table of contents.
7. Left colored full pages inside the front cover
   4.92 to 6.11 times as efficient as other colored full pages.
8. Right colored full pages inside the back cover
   From practically the same as other full pages under certain conditions to 1.77 times as efficient as others under different conditions.
9. Uncolored right full pages inside the front cover
   1.65 to 5.48 times as efficient as other full page uncolored advertisements, those just inside the back cover excepted.
10. Uncolored left full pages inside the back cover
    1.65 to 2.19 times as efficient as other uncolored full pages, those inside the front cover or coming very early in the magazine excepted.

[5] The terms front, middle and back here refer to the first, second and last thirds of the advertisements in the magazines. There were on the average 127 advertisements in the magazines studied. This average would permit us to consider advertisements numbering from 1 to 42 as the first third, those from 43 to 84 as the middle third, and those from 85 to 127 as the last third.

11. Back cover
    2.99 to 3.71 times as efficient as other colored full pages.
    1.73 times as efficient as colored double spreads.

GENERAL SUMMARY—RIGHT AND LEFT FACTORS

1. Left colored full pages
   1.20 to 1.75 times as efficient as right colored full pages.
2. Right uncolored full pages
   1.24 to 1.59 times as efficient as left uncolored full pages.
3. Right slightly colored full pages (not included in the list of colored advertisements).
   1.35 times as efficient as left slightly colored full pages.

GENERAL SUMMARY—POSITION ON THE PAGE

1. Quarter page upper left 1.43 times as efficient as quarter page lower left.
2. Quarter page marginal left 1.46 times as efficient as quarter page upper left and 2.23 times as efficient as quarter page lower left.
3. Quarter page upper right 1.68 times as efficient as quarter page lower right.

POSSIBLE REASONS FOR THE GREATER EFFICIENCY OF THE LEFT COLORED FULL PAGES AND THE RIGHT UNCOLORED FULL PAGES, IN ADDITION TO ANY VALUES POSSESSED BY REASON OF COPY, ILLUSTRATION, TYPE USED, ETC.

The general tendency upon opening the magazine is for the eyes to fall upon the left upper corner of the page as in beginning to read any page of printed matter. The color in the left-hand full page advertisements had some attention getting value. When the page was once focused, by reason of the color and other factors, there was probably a tendency for the subject to continue to observe it for some time. Furthermore, if the eyes once left the colored page and wandered to other parts of the open pages, they would be drawn again to the colored part, which was the most striking part of the open pages. The right colored full pages lacked the advantage which comes with the position of initial attention and were, consequently, surpassed by the left full pages. This argu-

ment is sustained by the fact that the right full page advertisements with only a small amount of color in them were more efficient than the left full pages with only a little color in them.

Upon first glance an uncolored full page advertisement may not present any striking feature. There is a tendency upon opening the magazine to explore the whole displayed part. If there is no striking feature, as color, to catch the eyes of the observer, they tend to be focussed on the left page first and then to be directed to other parts of the open magazine. The other parts of the pages may not be as striking in quality or form as the left uncolored advertisement, but the observer is more likely to continue to look for something new rather than to turn back to that which he has already explored. The left uncolored full pages, therefore, lose in value because of the lack of high initial attention getting value.

The case of the right full page uncolored advertisement is somewhat different from that of the left full page uncolored advertisement. Upon moving across the left page opposite the right uncolored advertisement the eyes are not likely to fall upon any especially striking feature. (This left page may be occupied by reading matter, etc.). Therefore, when the right full page is once reached the attention is likely to be centered upon it for a time, since it is designed to catch the attention and is in most cases at least slightly interesting. This last fact, coupled with the tendency to keep on searching rather than to turn back to materials explored immediately before, is perhaps the main reason for the greater efficiency (aside from the intrinsic worth of the advertisement itself) of the right uncolored advertisement.

REASONS WHY THE MARGINAL LEFT QUARTER PAGE IS SHOWN TO BE MORE EFFICIENT THAN THE UPPER LEFT QUARTER PAGE

The marginal left quarter page advertisements opposite full page uncolored advertisements are shown to be 1.56 times

as efficient as quarter pages upper left under the same conditions. The following reasons are suggested as possible explanations of the difference in efficiency of the two types of quarter pages.

The marginal left quarter page gets the full benefit of being placed on the left side of the page, which, according to Adams' results, is the most valuable position when the page is divided into vertical columns.[6] The upper left quarter page has the advantage of the most valuable position of all at the top of the left side of the page. It, however, extends towards the center of the page and thus comprises one of the less valuable parts of the page. Possibly the advantage gained by the left marginal quarter page because of position may be greater than that gained by the upper left quarter page. Moreover, the marginal left quarter page gains some advantage because it does not have to compete with another quarter page advertisement on the same page with it, as does the quarter page upper left.

There may have been some difference in interest and familiarity in the advertisements in the two classes in this case. There were four advertisements in the table of upper left quarter pages which were not recalled at all. There were only two advertisements in the table of marginal left quarter pages which were not recalled at all.

[6] Adams divided cards into fifteen, eight, four and two parts. He placed a small capital letter in each of the divisions; he varied the position of the letters so that each would appear in all the positions the same number of times. The cards were shown the subjects for one-half second and they were asked to write down the letters as they recalled them. The results were compiled to show how many times each rectangle was recalled first and how many times they were recalled at all. The findings showed the left side of the page to be the best vertical division, the top to be the best horizontal division, and the left-hand corner at the top of the page the best location on the page. The indications were that the bottom of the page had very little attention value. Adams, H. F., Advertising and Its Mental Laws, 92–99.

CONCLUSIONS

Size

1. The results show that colored double spreads have a wide range of values in comparison with the full page colored advertisements. The general conclusion is that a colored double spread is on the average worth approximately 2.1 times as much as a left full page colored advertisement, and 2.6 times as much as a right colored full page. A colored full page placed near the front of the magazine may be in some instances more valuable than a double spread coming later in the magazine. The general statements given above hold for double spreads and full pages in the same part of the magazine.

2. An uncolored double spread is worth about 3.4 times as much as a left full page uncolored advertisement and 2.5 times as much as a right full page when they all occur in the same part of the magazine. An uncolored full page advertisement placed very near the front may be in some instances more valuable than a double spread coming later in the magazine.

3. A full page uncolored advertisement is apparently worth about twice as much as a marginal left quarter page opposite a full page colored advertisement and 1.6 times as much as a quarter page opposite an uncolored full page advertisement. A full page uncolored advertisement is worth less than twice as much as a corresponding half page. The ratio lies between 1.5 to 1 and 1.75 to 1.

4. The full page uncolored advertisement is from four to five times as efficient as a corresponding outside lower quarter page and from 2 to 2.5 times as efficient as a corresponding outside upper quarter page.

5. The outside vertical half page is worth about 1.5 as much as the marginal left quarter page on the left page; a vertical half page on the outside of the right page and an upper right quarter page have approximately the same value. A right half page is 1.75 times as valuable as a lower right quarter page.

Color

1. Color makes little difference in double spreads; the colored double spreads were found to be only slightly more efficient than the uncolored.

2. In general a full page colored advertisement was found to be about twice as efficient as a full page uncolored advertisement when both were on the left side. (There was one exception to this finding; the left full page uncolored advertisements opposite non-humorous pictures and reading matter were found to be more efficient than colored pages opposite the same.)

3. The right full page uncolored advertisements and the right full page colored advertisements were found to be in general of approximately the same value. (The same exception is to be made in this case as in number 2 above.)

Position in the Magazine

1. The front part of the magazine is apparently from 1.5 to 2.5 times as valuable as advertising space as the back part. (The outside cover and those positions just inside the back cover excepted. The front section is also apparently twice as valuable as the middle section. (The different parts here spoken of mean the front, middle and back thirds of the magazine.) The back third is slightly more valuable than the middle third for some types of advertisements.

2. The position opposite the table of contents is less desirable than other positions opposite reading matter and small advertisements.

3. The position on the page with the table of contents is more desirable for a half page than other positions similar except for the table of contents.

4. The positions inside the front cover are more valuable than any other for colored or uncolored full page advertisements. (The back cover excepted.) Positions just inside the back cover are the next best for uncolored advertisements.

5. The back cover is the best position of all.

The Right and Left Factor

The left page is evidently better for colored advertisements and the right page for uncolored advertisements. The difference between the value for the right and left uncolored advertisements is much greater than the difference in value for the colored advertisements.

Position on the Page

The upper left on the left page and the upper right on the right page are approximately 1.5 times as valuable as the lower quarters on the same page and side.

The marginal left position is better than the upper left position.

These conclusions should not be accepted as final nor as an exclusive guide for practical purposes. They should be considered rather as the general findings from an extensive piece of research which give indications of the actual relative values of the different features in determining the efficiencies of advertisements. Further experiments must be conducted before the specific relative values found in this work can be offered as the undoubtedly correct ones. The practical advertiser can use the findings as a tentative guide, but he should also take other considerations into account.

A CHART FOR THE BETTER EVALUATION OF INTELLIGENCE QUOTIENTS

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The current practice for stating the formula of the intelligence quotient is to say that it may be obtained by dividing the mental age of the subject under consideration by his chronological age. Current practice follows this procedure up to the chronological age of 16, which age is used as the divisor for the intelligence quotients of all subjects of that age and older.

Such practice may be seriously questioned. In the first place, the formula

$$IQ = \frac{MA}{CA}$$

does not correctly state the concept of the intelligence quotient, inasmuch as the intelligence quotient represents a comparison of the intelligence of the subject under consideration with the intelligence of all persons of his age. Since it is a comparison of intelligence with intelligence, the divisor as well as the dividend must be some expression of intelligence. For example, an intelligence quotient of 100 presumes that the subject's intelligence is exactly equivalent to the central tendency of all others of his chronological age. Therefore, the IQ 100 must be obtained by dividing the mental age of the subject by the mean mental age of all persons of the subject's chronological age. Accordingly, a restatement of the formula for the intelligence quotient which will better reveal its basic concept might well be:

> The intelligence quotient of a subject may be obtained by dividing his mental age by the average mental age of subjects of his chronological age.*

* Since the writing of this article, it has been pointed out to the author that Dr. Arthur S. Otis, in his "Statistical Method in Educational Mea-

That this is in accordance with present authority is revealed by the following quotation from Terman:[1]

> "Native intelligence, insofar as it can be measured by tests now available, appears to improve but little after the age of 15 or 16 years. It follows that in calculating the IQ of an adult subject, it will be necessary to disregard the years he has lived beyond the point where intelligence obtains its final development.
>
> "Although the location of this point is not exactly known, it will be sufficiently accurate for our purpose to assume its location at 16 years."

It seems to be quite clear that Terman has been using the term, chronological age, to represent the average development of native intelligence, in other words, average mental age, when he states the formula for the intelligence quotient. This would seem to be further implied in his acceptance of 100 IQ as representing average intelligence; for in systems of indices in which 100 represents the average, the common divisor by which the indices are determined is the average itself. The fact that he chooses the chronological age at which native intelligence seems to cease to improve as the divisor in the case of adults points quite clearly to an assumption that that age represents the approximate average mental age of adults.

In the second place, the practice of using chronological age as the divisor to the age of 16, and thereafter using 16 as the divisor, assumes for intelligence a growth curve not found for any other biological trait. Figure 1, accompanying this article, illustrates this point. It will be seen on this figure that the graph of 100 IQ proceeds as a perfectly straight line from the intersection of 16 CA and 16 MA. At the latter point it makes a sharp bend and proceeds as a perfectly

surement," page 152, has recommended using as the denominator of the fraction, when figuring the intelligence quotient, not the chronological age of the individual, but the Binet mental age which is the norm for his age.

[1] Terman, Lewis M. *The Measurement of Intelligence.* Houghton Mifflin Co., New York City, 1916.

straight line along the line of 16 MA. As represented by this graph, the line of 100 IQ does not resemble a growth curve. Such a curve is not expected to be angular.

Otis[2] has worked out a curve of mental growth in the standardization of his Self-Administering Tests of Mental Ability. The upper end of his curve is shown on Figure 1 as a broken line.

A table of estimated average mental ages may be derived from the graph of 100 IQ in the Interpretation Chart of Otis' Self-Administering Tests as follows.

TABLE OF ESTIMATED AVERAGE MENTAL AGES

EQUIVALENTS		EQUIVALENTS		EQUIVALENTS	
CA Yrs. Mo.	Av. MA Yrs. Mo.	CA Yrs. Mo.	Av. MA Yrs. Mo.	CA Yrs. Mo.	Av. MA Yrs. Mo.
8–0	7–10	11–6	11–6	15–0	14–4
2	11	8	8	2	5
4	8–1	10	10	4	6
6	4	12–0	12–0	6	7
8	7	2	2	8	8
10	10	4	4	10	9
9–0	9–0	6	6	16–0	10
2	2	8	7	2	11
4	4	10	9	4	11
6	6	13–0	10	6	15–0
8	8	2	13–0	8	1
10	10	4	2	10	1
10–0	10–0	6	4	17–0	2
2	2	8	5	2	3
4	4	10	5	4	3
6	6	14–0	7	6	3
8	8	2	9	8	3
10	10	4	11	10	4
11–0	11–0	6	14–0	18–0	4
2	2	8	1	2	4
4	4	10	3	4	4

[2] Otis, Arthur S. *Manual of Otis Self-Administering Test of Mental Ability.* World Book Company, Yonkers-on-Hudson, N. Y., 1922, 1928.

Otis accepts these relationships as equal to 100 IQ. Thus, if a subject's chronological age is 15–0 and his mental age is 14–4, the subject falls at the average mental age of his group and is reported as 100 IQ. This is five points higher than the result, 95 IQ, given by the usual method of calculation. An inspection of Otis' chart and manual will show that he does not obtain IQ values other than 100 by dividing the mental age equivalent of a score in his tests by these means.

However, these averages are more acceptable above the age of 12–6 as divisors in determining the IQ than the ages at present used for several reasons. One is the fact that they effect a gradual rounding off of the curve of development to its final plateau rather than an abrupt angle. Another is the findings of the army psychologists, which placed the average development of adults below 16 MA. Another is the statement of Terman, quoted above, that the average adult level is somewhere between 15 and 16 years. Another is the fact that the point 12–6 MA is above the limit of the age norms Terman used in his distribution of 905 intelligence quotients,[3] the distribution from which he drew his conclusions concerning intelligence quotients. All these considerations have led the writer to construct a chart, which is here submitted, for the convenient calculation of intelligence quotients with Otis' mental ages as the divisors.

This chart has been scaled on the vertical edge in chronological ages and on the horizontal edge in mental ages. To use the chart one should follow the perpendicular projections from these scales to their intersection within the body of the chart, where the intelligence quotient may be read. Attention is called to the fact that all the scaling is done in even numbers, making it necessary to approximate odd numbers.

All of the intelligence quotients for chronological ages above 12–6 will be found to be higher than those calculated by the usual method. This will to some extent counteract the tendency of adolescents to show a lower intelligence quotient than they showed as children. Such tendency will not be

[3] *Loc. cit.*

entirely counteracted, however; for, if mental age 15–4 be accepted as the average age for adults, to obtain an intelligence quotient of 200 (a score near the calculated upper limit of the range of intelligence quotients), it would be necessary to scale mental ages up to 30 years 8 months. Tests with such high scoring are not at present available.

This chart for the evaluation of intelligence quotients must be taken as a tentative scale. It will be necessary to have tests which will more thoroughly explore the upper range of intelligence, so that central tendencies may more accurately be determined, before the averages for various ages may be determined.

Another mathematical hazard must be considered also. The fact that the line of 100 IQ (average mental age relationship) changes its direction with reference to the abscissa and ordinate may result in the relationships of intelligence quotients of adults being different from the relationships of the intelligence quotients of children. Thus the simple division of mental age by mean mental age of the chronological age group may prove not to serve to interpret by the same intelligence quotient the intelligence of an adult in terms of what it was as a child.

An incidental effect of considering the intelligence quotient an index whose divisor is a mean is to be observed regarding its probable error. Whereas the probable error of a quotient is greater in proportion than that of either its divisor or its dividend, the probable error of an index is proportionate to that of its dividend within narrow limits. For example, the Accomplishment Quotient, when calculated by dividing educational age by mental age. Here we have two scores with relatively large probable errors. For instance, if Ed. A equals 120 ± 2 months; and MA equals 120 ± 2 months, then

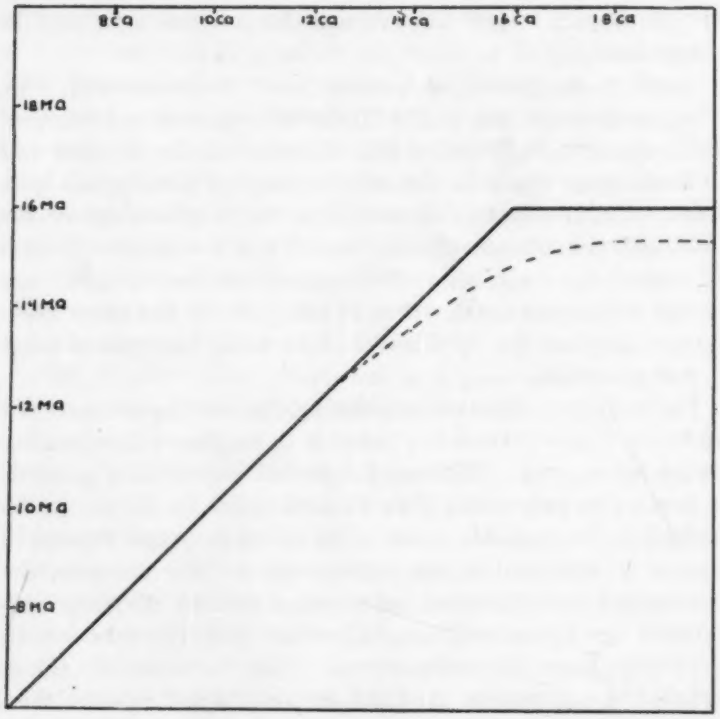
$$AQ = \frac{120 \pm 2}{120 \pm 2} = 96.7 \text{ to } 103.4.$$

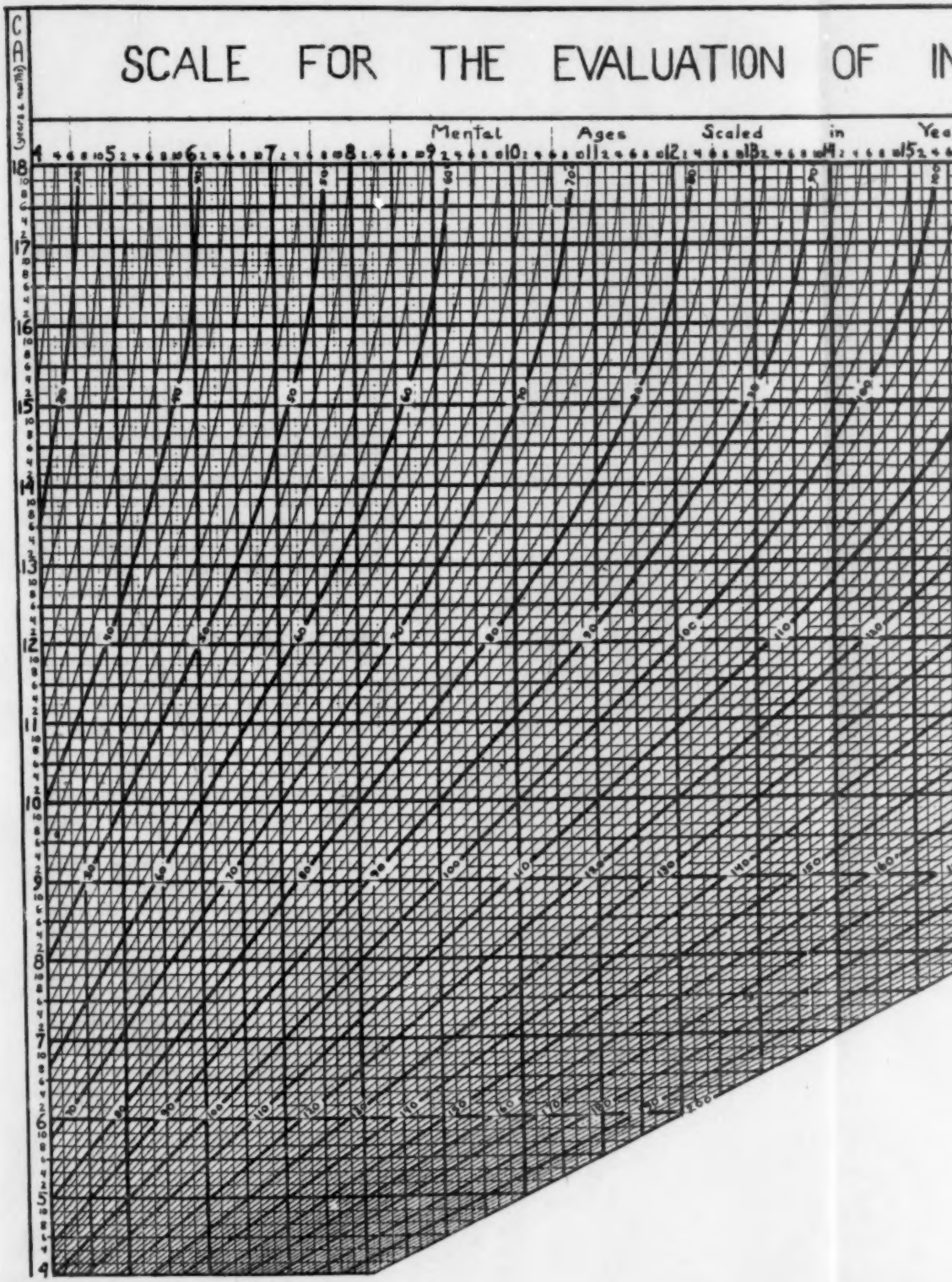
If an intelligence quotient be calculated, using 120 months as the divisor, the PE of the divisor may be disregarded; for

the probable error of a mean is equal to the PE of the distribution divided by the square root of the number of cases, and is always small. Therefore, when MA equals 120 ± 2 months and the mean MA of the chronological age level is 120 months, we have:

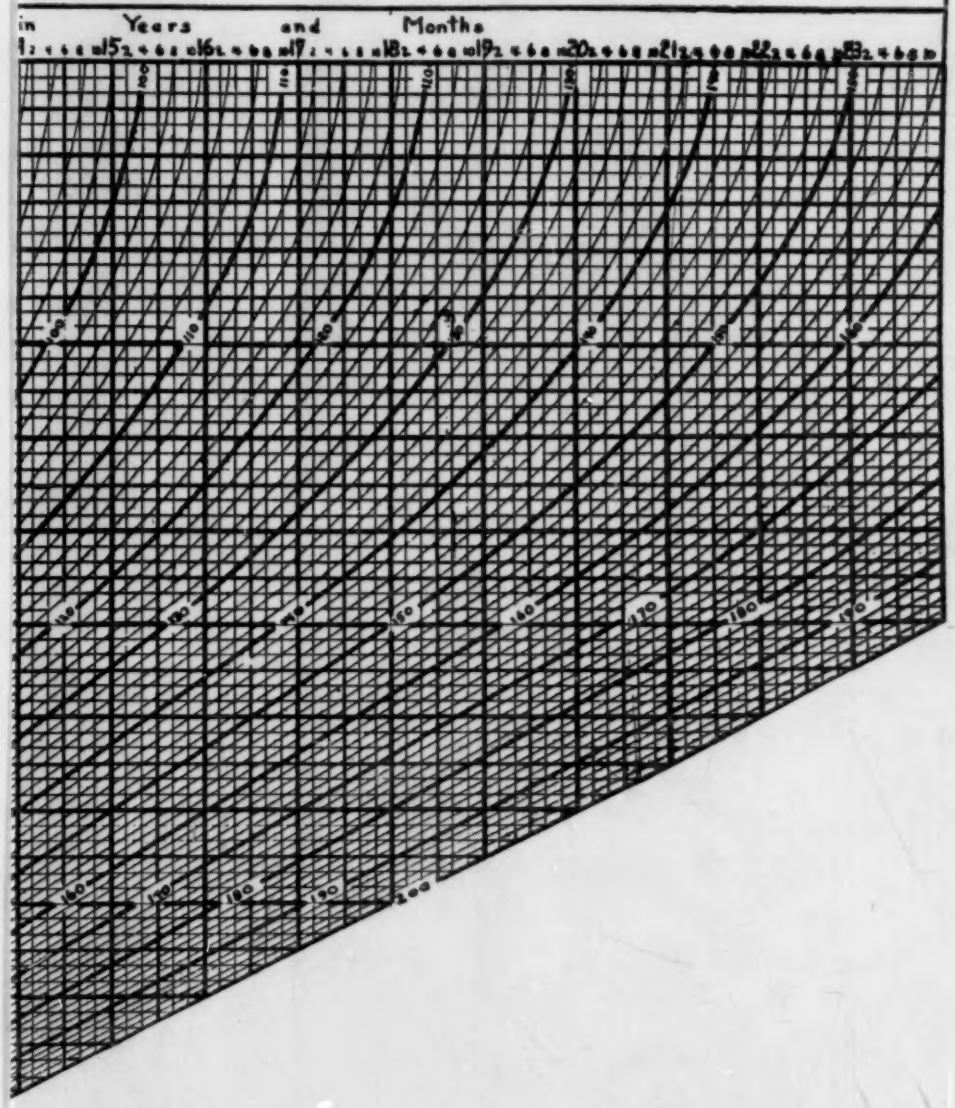
$$IQ = \frac{120 \pm 2}{120} = 98.3 \text{ to } 101.7.$$

This incidental effect would appear to have considerable statistical significance.




SCALE FOR THE EVALUATION OF IN
Mental Ages Scaled in Yea
CA (years & months)

OF INTELLIGENCE QUOTIENTS



NOTES AND NEWS

According to a recent report by the New York Commission on Ventilation there are still twenty states in the Union which retain statutes concerning ventilating devices which are based on disproved or antiquated theories. Dr. C.-E. A. Winslow, chairman of the Commission, estimates that an unnecessary expenditure of nearly $2,500,000 annually is made in an attempt to conform to obsolete regulations requiring the installation and maintenance in school buildings of a system of mechanical ventilation which science has proved to be not only unnecessary but even a menace to health.

The Stanford University Press announces the first of a projected series of tests for junior colleges, under the editorship of Walter Crosby Eells. The first number, a test in English, has been constructed by Professor Eells and David Segel and "is designed primarily to furnish a measure of accomplishment in the knowledge of English language and literature for students who have completed the course of study in junior colleges." It may also be used to measure progress at the close of one or more semesters of study of English.

The Twelfth Annual Ohio State Educational Conference is to be held in Columbus, April 7, 8, 9, 1932. "Education as Social Investment" will be the keynote of the two general and the thirty-six sectional meetings. Walter Lippman, of the New York Herald-Tribune, and Charles H. Judd, Head of the Department of Education of the University of Chicago, will address the general sessions. Other well-known speakers in whom readers of this Journal will be particularly interested in hearing will include John E. Anderson, University of Minnesota; Hugh Hartshorne, Yale University, and L. L. Thurstone, University of Chicago.

Announcement has recently been made by Ray Lyman Wilbur, Secretary of the Interior, of the appointment of Dr. David Segel, Long Beach, California, to the position of specialist in educational tests and measurements in the Federal Office of Education. For the past seven years Dr. Segel has been in the research department of the Long Beach City Schools. The duties of the new education specialist will consist of conducting studies concerning the construction and evaluation of tests and measures of pupil progress, efficiency of teaching, and adequacy of the school program; to administer measurement programs, interpret results, make administrative adjustments and curriculum changes based on results of testing programs, and to cooperate with bureaus of research in

city school systems, other research agencies, and individuals in making studies in this field. Dr. Segel will also organize and conduct an information service for school officials and others interested in problems of tests and measurements.

Questionnaires on the administration of film service in public elementary and high schools throughout the United States distributed through the Motion Picture Division, Department of Commerce, with the cooperation of the Office of Education, were returned by 6,000 principals and superintendents. The findings, included in Office of Education Circular No. 46, reveal that "more than 60 per cent of schools represented by these school administrators use motion picture films in some way for educational purposes." Forty per cent of the total motion picture offerings were in the social sciences, and 26 per cent in the natural sciences. The inquiry reveals that motion pictures were reported by 98.9 per cent of teachers as being helpful or very helpful in creating an increased interest in school work and a sustained interest in topics studied.

Syracuse University announces the establishment of an independent department of psychology, with Dr. Ernst Thelin as head of the department. Until the present time, psychology and philosophy have been operating as a single department at Syracuse, despite the fact that in nearly all other universities they have established separate organizations. At Syracuse such a change was deferred, owing to the satisfactory operation of both these branches of teaching under the head of the Department of Philosophy. But in recent years psychology has grown at Syracuse from a simple department in Philosophy to a group including 16 sections of Introductory Psychology and 18 advanced courses, with a total enrollment of 1,000 students.

BOOK REVIEWS

KRUEGER, E. F., AND RECKLESS, W. C. *Social Psychology.* Longmans, Green & Co., New York. 1931. vii + 565 pp. $3.00.

In the current wave of social psychology texts, this volume will command more than passing interest, not so much for any new view-point or novel organization but for the reason that it presents in a compact manner the view-point of the Chicago School. For those particularly who have had Chicago training, the subject-matter on language, social objects, wishes, view-points on instinct, treatment of attitudes and personality—will be more or less familiar reading. The authors have put their own interpretation on this subject-matter, it is true, but the reflection of the teachings of Mead, Faris, Thomas and Park pervades considerable sections of the text. All of this is quite fortunate in view of the meager writings which Mead has now left.

The volume is an interesting blending of psychological and sociological treatment. In one section we find the usual sociological arguments for the social interaction explanation of human nature and in another section, discussions on the forms, types, and variations of imagination, reasoning and play, such as one would not expect to find outside of a text on general psychology. The first five chapters lead up through the mechanics of to the nature of social behavior. Language comes in for its full share of consideration with the related aspects of social objects and social definitions. In Chapter V we have both the simple person-to-person behavior sketched as well as the complex phases of crowd and mob behavior. Chapter VI is a resumé of various treatments given inherited behavior patterns, quoting sections and classifications from various writers with the conclusion that a better explanation is had in custom control, but there remains a hint here that the psycho-analysts, particularly in their doctrine of wishes, hold hope for a better explanation. They proceed in the next chapter to discuss this new field of explanation. Two long chapters on attitudes follow the one on imagination in which there is much hair-splitting on every conceivable distinction and description of this concept now so popular with social psychologists and sociologists alike. The reviewer does not see the utility in such distinctions as are made between innate and acquired attitudes, conscious and unconscious, objective and non-objective, individual and group and cultural and collective, nor does he see particular gain in the extremely detailed discussion of the concept. In doing so, Professor Krueger is running the same risk of rendering the term unworkable in the same way that he

criticizes instinct. The chapter on traits of personality is followed by one on social adjustment. An appendix contains some behavior observations of children and is followed by one presenting the case history of an adult. A very complete bibliography, exercises, and questions are also included.

The reviewer is impressed with the readableness and interesting character of the content. The volume, however, lacks the direct, well-organized character of Allport's text, although some readers will welcome the absence in Krueger and Reckless of physiological and neurological materials. The impression one gets of the text is that it is too much of a cataloging treatment. The writers have apparently felt some urge to include every related concept or related aspect of a theory or view-point, without a compensating organization, a practice which becomes tedious to the reader and renders it, in the reviewer's opinion, less easily assimilated by the student. Allport, in contrast, presents a comprehensive and understandable theory of crowd behavior and action. Krueger and Reckless give the reader a collection of ideas about crowd characteristics, collective representation, orgiastic crowds, suggestion, leadership, social epidemics, news, propaganda, person-to-person contacts, summation and consummation, the incomplete act, play, and other ideas. The reader is not left with any clear-cut formula by which he may, ten or twenty years later, attempt to control or even interpret crowd behavior.

In passing, one is moved to express admiration for the really good workmanship bestowed by the publisher upon this book. Both binding and typography are welcome innovations in the production of something beyond mere drab text-books. The small and compact size belies the 565 pages carrying a wealth of material and extended discussions.

NORMAN C. MEIER,
University of Iowa.

MURCHISON, CARL (editor). *A Handbook of Child Psychology.* Worcester, Mass., Clark University Press. 1931. xii + 711 pp.

The *Handbuch* has been described as a typically German institution, but the determined efforts of Editor Murchison are resulting in a useful series of compendia with an American imprint but international in authorship. The latest member of the International University Series in Psychology, the *Handbook of Child Psychology,* worthily takes its place with the earlier volumes.

The twenty-two papers comprising its contents cover all important phases of the psychology of childhood. Eleven of the papers, *viz.*, those concerned with conditioning emotions (M. C. Jones), twins (Gesell), order of birth in relation to development (H. E. Jones), physical and mental growth (Wellman), language (McCarthy), learning (Peterson),

morals (V. Jones), drawing (Goodenough), play and amusements (Marshall), feeblemindedness (Pintner), are able reviews of the literature in their respective fields. Each is accompanied by an excellent bibliography. Five of the papers, *viz.*, those concerned with methods (J. E. Anderson), social behavior (Charlotte Bühler), gifted child (Terman), special abilities and deficiencies (L. S. Hollingworth), and the eidetic child (Klüver), consist in varying degrees of the author's own results and point of view plus a review of the literature.

The remaining seven papers may be described as original in that they report an experiment or series of experiments and only incidentally refer to the literature. Helen T. Woolley writes a practical paper on methods of training eating, sleeping and elimination habits. Kurt Lewin, in a very suggestive paper, presents a dynamic concept of the psychological relation of the environment to the child's behavior. Susan Isaacs reports the results of an attempt to so organize a school that the children have optimal conditions for mental growth. Jean Piaget summarizes his theories of children's reasoning as earlier reported in book form. C. W. Kimmins presents and analyzes a series of dreams reported by children from five to sixteen years of age. Anna Freud explains childhood from the psychoanalytic point of view. Margaret Mead briefly presents her conclusions regarding primitive childhood and suggests problems for further research in this field.

The authors of the papers so briefly cited are sufficient guarantee of the quality of the reviews. Considered as a whole this *Handbook* is an extremely useful compendium of the present status of our knowledge of the psychology of childhood. It should be in the library of every individual organization working with children.

STANLEY D. PORTEUS. *The Psychology of a Primitive People. A Study of the Australian Aborigine.* New York, Longmans, Green & Co., 1931, xvi + 438 pp. $6.00.

This latest work of Mr. Porteus' is concerned with the Australian aborigines who are generally considered the most primitive of the genus *Homo*. With this tradition the author does not agree and he offers cogent arguments in the first two sections of the book to prove his contention.

The first third or so of the book presents a very delightful and entertaining travelogue of the author's trip in the northwest and central portions of the Australian continent. Description of the physical and biological environment, as well as accounts of native activities, serve to acquaint the reader with the conditions of the life of these people. In the second third of his work the author discusses aboriginal intelligence, in the light of his definition of intelligence as "progressive adapt-

ability,'' by critically reviewing the views of several earlier writers on Australia, as well as adding new information and a reinterpretation. In brief, Mr. Porteus sees in the customs and beliefs of the Australian intelligent modes of adapting to a very severe environment.

In the last portion of the book are presented the methods and results of the testing program involving physical, psychophysical (really psychomotor tests involving the function of large muscle groups) and intelligence tests. The total number of subjects include 130 male adults, 11 female adults, and 127 children, although no one test was given to even all of the adult males.

The data on this very small sampling are presented with an undue amount of space devoted to justifying the use of certain tests. Nearly half of the discussion of head measurements is devoted to answering criticisms of the author's previous work, and over half of the discussion concerning the Porteus Maze Test is devoted to a history and annotated bibliography. Throughout the section are many pages devoted to a similar purpose. The author argues that this material must be given to provide a background for the reader, but quite often this so-called background would need considerable elucidation before the untrained reader could follow it.

Furthermore the results are interpreted with qualifications, apparently so that they will conform to the author's conclusions given in the following paragraph:

''Summarizing the test results we may say that, considering their unfamiliarity with the test situation the aborigines' response to tests of prudence and planning capacity, discrimination of form and special relations in test material familiar to them was little if any inferior to that of whites. In tests scored on speed their performance rated low, mainly because working against time was contrary to their habit. In rote memory they were particularly deficient when the test was an auditory one, less deficient, but still very inferior, when it was visually presented. They are not unintelligent, but are certainly inadaptable to a civilized environment.''

Prudence and planning capacity are supposedly measured by the Porteus Maze Test on which the average score of 104 adult males was 10.97 years, or in terms of IQ was 80. In comparison Porteus says the average IQ of American children is 97. These seventeen points in IQ are attributed to unfamiliarity with the test situation. Their low time scores are attributed to the fact that they are not in the habit of working against time. On page 379 the author criticizes Garth, who takes the position that racial differences in test results may be explained on the basis of cultural and language differences. These two points-of-view certainly are not consistent.

The last sentence of the above quoted concluding paragraph says that these natives "are not unintelligent, but are certainly inadaptable to a civilized environment." I can find no substantial support for this statement. It apparently depends on their low rote memory performance (*cf.* page 380) which might easily be influenced by unfamiliarity. This is especially so inasmuch as "very many" of the subjects could not count above five, although "they were at least familiar with the names of the numbers." The only check on this point the author offers is a brief statement that those who did poorly on the digit span also did poorly when syllables in aboriginal names were used.

Because of the large number of measurements (21 including all of the three groups) it is impossible to discuss them all. I have felt that a critique of the author's own conclusion was sufficient to illustrate the weakness of this last section. The report of the testing program does not add to the coherence of the whole book nor to the author's thesis as earlier presented. It would probably have appeared to much greater advantage as a separate monograph without the many pages of justifying argument.

C. M. Louttit,
Indiana University.

Lucas, D. B., and Benson, C. E. *Psychology for Advertisers.* Harper and Brothers, New York, 1930. pp. xv + 351; $3.50.

The writers have attempted to outline psychological principles which can be of help to advertisers. As such they disclaim trying to tell how to construct advertisements; this field they leave to texts on economic aspects. Accordingly, a large share of the book is devoted to analysis of motives and appeals which may be used to stimulate the customer to purchase, which is of course the final aim of advertising.

The authors are to be particularly congratulated for this emphasis and even more so on the method of treating the problems arising. Many texts still include principles of psychology held around the beginning of the century and which have been superseded. Instincts constitute the chief offenders along this line; many books list extensive classifications and suggest selling by appealing to these fundamental and native forces. Benson and Lucas on the other hand have dealt with the motives, which include learned components more than native drives; they give evidence for their existence, and analyze the various ways in which they are expressed. Advertisements are presented which display actual appeals to these motivations.

The discussion of positive and negative appeals seems to the reviewer the best chapter in the book. The recent flood of advertisements of the "Athlete's Foot" and "Body Odor" type tend to antagonize readers who are at all sensitive or think clearly enough to recognize a subtle

appeal to fear of a type which is personal and difficult to verify. Sales may be built up by this means, but it is doubtful if the public can be humbugged indefinitely. Some negative appeals, as those emphasizing the evils of poor health, have a certain positive aspect to them and are perhaps more justified. The writers emphasize these points clearly, although at the same time admitting the value of negative appeals. After all, sales are what count, so long as aesthetics are not too far trampled upon.

The factor of layout is treated well, from a standpoint of practical aesthetics. Effects of color according to the data presented do not seem to be as great as previous writers have insisted.

The latter third of the book deals with means of checking up the value of advertisements. The chapter on statistical methods seems a trifle superfluous, occupying too large a percentage of the total, but at the same time hardly going into the matter deeply enough to satisfy the practical user of the methods outlined. Shorter presentation, with reference to complete texts on statistics, would give opportunity for presentation of more central material.

The measures employable in the laboratory are well chosen. The writers have not lost sight of practical use and have omitted material which others have included, which is perfectly sound but is too abstract to be put to much use in actual practice. Factors of differences between groups to which a commodity might appeal are nicely brought out.

An interesting thought comes up in examining advertisements presented as samples. On page 94 there is a Dodge Car of 1925, although the text was published in 1930. Apparently the authors collected samples of good advertisements as time went along. This may be a technical point, since a reader of a text such as this is interested in principles, not minor details. But since being up to date is emphasized in practice, theory might set a good example. This same line of thought suggests change in a few plates in later editions of almost any work which are published after a few years and present material of a nature disclosing time. Styles of clothing as well as of products go out of date quickly. Good advertisements should be easy to select to replace those outworn; if suitable ones can not be found it would indicate that the principle illustrated was either out of fashion or so individual that general application would not be possible after all.

All in all, the book is one of the best of recent years, and the reviewer feels that it has by far the best treatment of human nature, both in topics selected and in discussion. Several of the chapters could be read with profit by students taking elementary courses, entirely apart from reference to advertising.

RICHARD WELLINGTON HUSBAND,
University of Wisconsin

NEW BOOKS AND PAMPHLETS RECEIVED

Books and pamphlets for review should be sent to James P. Porter, Editor of THE JOURNAL OF APPLIED PSYCHOLOGY, Ohio University, Athens, Ohio.

Anger in Young Children. FLORENCE L. GOODENOUGH. University of Minnesota Press, Minneapolis, Minn. $2.50. 278 pp.

Bibliography of Research Studies in Education 1929–30. EDITH A. WRIGHT. Bulletin No. 13, 1931, Library Division, Office of Education, Government Printing Office, Washington, D. C. 85 cents. 475 pp.

Contributi del Laboratorio di Psicologia. AGOSTINO GEMELLI AND ARCANGELO GALLI. Societa Editrice, "Vita e Pensiero," Milano, 1931. 572 pp.

A Critical Summary of Research Relating to the Teaching of Arithmetic. WALTER S. MONROE AND MAX D. ENGELHART. University of Illinois Bulletin, Vol. XXIX, No. 5. University of Illinois, Urbana, Illinois, 1931. 50 cents. 115 pp.

The Development of Mental Health in a Group of Young Children. ELIZABETH SKELDING MOORE. University of Iowa Studies, Vol. IV, No. 6. University of Iowa, Iowa City, Iowa. $1.15. 128 pp.

Facts and Fetishes in Advertising. E. T. GUNDLACH. Consolidated Book Publishers, Chicago, Illinois, 1931. $5.00. 672 pp.

The Healthy-Minded Child. NELSON ANTRIM CRAWFORD AND KARL A. MENNINGER. Coward-McCann Company, New York City, 1930. $1.75. 198 pp.

How To Be Happy Though Human. W. BÉRAN WOLFE. Farrar & Rinehart, New York City, 1931. $3.50. 391 pp.

An Investigation of the Responses made in Learning a Multiple Choice Maze. FREDERICK HILLIS LUMLEY. Psychological Monographs, Vol. XLII, No. 2. Princeton, N. J. 61 pp.

The Meaning of Music. CARROLL C. PRATT. McGraw-Hill Book Company, New York City. $2.00. 253 pp.

The Mind in Action. A. CAMPBELL GARNETT. D. Appleton & Company, New York City. $2.00. 226 pp.

Modern Psychologies and Education. CLARENCE E. RAGSDALE. Macmillan Company, New York City, 1932. $2.25. 407 pp.

Modern School Achievement Test. GATES, MORT, SYMONDS, *et al.* Bureau of Publications, Teachers College, Columbia University, New York City. $7.20 per 100 copies. 32 pp.

Present Day Psychology. ALENE RALSTON AND CATHARINE J. GAGE. J. B. Lippincott Company, Chicago, Illinois. $2.40. 404 pp.

Provisions for Mentally Atypical Pupils. CHARLES W. ODELL. University of Illinois Bulletin, Vol. XXIX, No. 6. Bureau of Educational Research Bulletin, No. 59. University of Illinois, Urbana, Ill. 50 cents. 73 pp.

The Psychology of the Inventor. JOSEPH ROSSMAN. The Inventor's Publishing Company, Washington, D. C. $3.00. 252 pp.

Psychology of a Primitive People. S. D. PORTEUS. Longmans, Green & Company, New York City, 1931. $6.00. 438 pp.

Race Attitudes of Iowa Children. RALPH D. MINARD. University of Iowa Studies in Character, Vol. IV, No. 2. University of Iowa, Iowa City, Iowa. 101 pp.

The Reading Abilities of College Students. ALVIN C. EURICH. University of Minnesota Press, Minneapolis, Minn. $2.50. 208 pp.

Report Cards for Kindergarten and Elementary Grades. ROWNA HANSEN. Office of Education, Leaflet No. 41, United States Department of the Interior, Washington, D. C. 10 cents. 24 pp.

Die Soziale Seite der Psychotechnik. FRANZISKA BAUMGARTEN. Die Soziale Praxis, Berlin W 30. Nollenderfstr. 29–30, Berlin, Germany. 18 pp.

Speech Sounds of Young Children. BETH WELLMAN, IDA MAE CASE, IDA GAARDER MENGERT, DOROTHY E. BRADBURY. University of Iowa Studies, Vol. V, No. 2. University of Iowa, Iowa City, Iowa. $1.00. 82 pp.

State Programs for the Improvement of Rural School Instruction. ANNIE REYNOLDS. Office of Education, United States Department of the Interior, Bulletin 1931, No. 18. 10 cents. 32 pp.

A Study Manual to Accompany Dashiell's Fundamentals of Objective Psychology. ALFRED G. DIETZE. Department of Psychology, University of Pittsburgh, Pittsburgh, Pa. 127 pp.

The Use of the Self. F. MATTHIAS ALEXANDER. E. P. Dutton & Company, New York City, 1932. 143 pp.

The Wholesome Personality. WILLIAM H. BURNHAM. D. Appleton & Company, New York, 1932. $2.75. 713 pp.

The Work of the Institute of School Experimentation. OTIS W. CALDWELL and others. Bureau of Publications, Teachers College, Columbia University, New York City, 1931. 35 pp.

Directory of American Psychological Periodicals

(Continued)

Psychological Abstracts—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $6.00. 700 pages ann. Edited by W. S. Hunter. Monthly. Abstracts of psychological literature. Founded 1927.

Journal of General Psychology—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

Journal of Social Psychology—Worcester, Mass.: Clark University Press. Subscription $7.00. 500 pages annually. Edited by John Dewey, Carl Murchison, and an international cooperating board. Quarterly. Political, racial, and differential psychology. Founded 1929.

Personnel Journal—Baltimore: The Williams & Wilkins Co. Subscription $5.00. 500 pages, approximately. Edited by Walter V. Bingham. Bi-Monthly.

Mental Measurement Monographs—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research. Founded 1925.

Studies in Psychology and Psychiatry—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Edward A. Pace. Published without fixed dates, each number a single research. Founded 1926.

Journal of Philosophy—New York: 515 West 116th Street. Subscription $4.00. 728 pages per volume. Founded 1904. Bi-weekly. Edited by F. J. E. Woodbridge, Wendell T. Bush, and H. W. Schneider.

Child Development—Baltimore, Md.: Williams & Wilkins Company. Subscription. $5.00. 400 pages annually. Edited by Buford Johnson. Quarterly. Founded 1930.

Directory of American Psychological Periodicals

American Journal of Psychology—Ithaca, N. Y.: Cornell University. Subscription $4.50. 624 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

Pedagogical Seminary and Journal of Genetic Psychology—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Child behavior, animal behavior and comparative psychology. Founded 1891.

Psychological Review—Princeton, N. J.: Psychological Review Company. Subscription $5.50. 540 pages annually. Bi-monthly. General Psychology. Edited by Howard C. Warren. Founded 1894.

Psychological Monographs—Princeton, N. J.: Psychological Review Company. Subscription $6.00 per vol. 500 pp. Ed. by Raymond Dodge. Published without fixed dates, each issue one or more researches. Founded 1895.

Psychological Index—Princeton, N. J.: Psychological Review Company. Subscription $4.00. 300–400 pp. Edited by W. S. Hunter. An annual bibliography of psychological literature. Founded 1895.

Psychological Bulletin—Princeton, N. J.: Psychological Review Company. Subscription $6.00. 720 pages annually. Psychological literature. Monthly. Edited by Edward S. Robinson. Founded 1904.

Archives of Psychology—New York: Columbia University. Subscription $6. 500 pp. ann. Ed. by R. S. Woodworth. Published without fixed dates, each number a single experimental study. Founded 1906.

Journal of Abnormal and Social Psychology—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $5. Foreign, $5.25. Editor, Henry T. Moore. Quarterly. 448 pages annually. Abnormal and Social. Founded 1906.

Psychological Clinic—Philadelphia: Psychological Clinic Press. Subscription $3.00. 288 pages. Ed. by Lightner Witmer. Without fixed dates (9 Numbers). Orthogenics, psychology, hygiene. Founded 1907.

Psychoanalytic Review—Washington, D. C.: 3617 10th St., N. W. Subscription $6. 500 pages annually. Psychoanalysis. Quarterly. Ed. by W. A. White and S. E. Jelliffe. Founded 1913.

Journal of Experimental Psychology—Princeton, N. J. Psychological Review Company. 500 pages annually. Experimental. Subscription $6.00. Bi-monthly. Edited by S. W. Fernberger. Founded 1916.

Journal of Applied Psychology—Lancaster: The Science Press Printing Co. Subscription $5.00. 400 pages annually. Bi-monthly. Edited by James P. Porter, Ohio University, Athens, Ohio. Founded 1917.

Journal of Comparative Psychology—Baltimore: The Williams & Wilkins Co. Subscription $5.00 per volume of 450 pages. Three volumes every two years. Edited by Knight Dunlap and Robert M. Yerkes. Founded 1921.

Comparative Psychology Monographs—Baltimore: Johns Hopkins University Press. Subscription $5. 400 pages per volume. Knight Dunlap, Managing Editor. Published without fixed dates, each number a single research.

Genetic Psychology Monographs—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Monthly. Each number one complete research. Child behavior, animal behavior, and comparative psychology. Founded 1925.

(Continued on Third Cover)